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ROMAN POTTERY
IN THE
ARCHAEOLOGICAL
RECORD



J. THEODORE PEÑA

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Roman Pottery in the Archaeological Record

This book examines how Romans used their pottery and the implications of these practices for the archaeological record. It is organized around a flow model for the life cycle of Roman pottery that includes a set of eight distinct practices: manufacture, distribution, prime use, reuse, maintenance, recycling, discard, and reclamation. J. Theodore Peña evaluates how these practices operated, how they have shaped the archaeological record, and the implications of these processes for archaeological research through the examination of a wide array of archaeological, textual, representational, and comparative ethnographic evidence. The result is a rich portrayal of the dynamic that shaped the archaeological record of the ancient Romans that will be of interest to archaeologists, ceramicists, and students of material culture.

J. Theodore Peña is Chair of the Department of Classics at the University at Buffalo, SUNY. A specialist in the archaeology of the Roman economy and ceramic analysis, he is the author of *The Urban Economy in the Early Dominate: Pottery Evidence from the Palatine Hill* and *The Mobilization of State Olive Oil in Roman Africa: The Evidence of Late 4th Century Ostraca from Carthage*.

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*En memoria de mi padre, José Ángel Peña,
quien siempre anheló parir un libro.*

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Introduction



Pottery represents the most abundant category of portable material culture to come down to us from the Roman world, and it is thus by no means either surprising or inappropriate that pottery studies have enjoyed a position of some prominence in Roman archaeology. Whereas investigations carried out in the early years of Roman pottery research were concerned primarily with questions of typology and chronology, in the 1970s students of Roman pottery embraced the realization that pottery constitutes an important source of information regarding various aspects of the economic life of the Roman world, and much of the research that has been carried out since that time has focused on topics such as the geography, organization, and technology of pottery production; the mechanisms and intensity of pottery distribution; and the consumption, use, and performance characteristics of pottery. More recently, with the introduction into Roman archaeology of theoretical perspectives and research methods drawn from post-processual archaeology and material culture studies, students of Roman pottery have begun to explore ways in which pottery evidence can be mobilized to investigate topics such as the definition of individual and group identity, opening windows onto a range of social and ideological issues, such as native acceptance of and resistance to incorporation into Roman social, political, and economic systems, and the expression of gender in the Roman world.

Although the typological, chronological, economic, and sociological analysis of Roman pottery generally involves the study of groups of materials that represent the end result of a complex set of behaviors on the part of those who produced, distributed, and used pottery, students of Roman pottery have shown themselves largely indifferent to the investigation of these behaviors and their implications for how and when different kinds of pottery came to be incorporated in different amounts and in different conditions into different kinds of archaeological deposits in different kinds of locations. As a result, we know surprisingly little about these questions, and Roman pottery specialists have been, and are at present, operating on the basis of a set of unjustifiably optimistic, untested, and – to some extent – false

assumptions regarding the origin and significance of patterning in pottery data, leaving open to question the significance of the results of much pottery research.

The purpose of this book is to begin the process of redressing this regrettable situation by articulating a general model of the life cycle of Roman pottery that will enable pottery researchers to more effectively envision the set of behaviors that governed the formation of the Roman pottery record – here defined as the universe of archaeological deposits containing Roman pottery that were formed during the Roman period – and to gain some appreciation of both the general and specific effects that these behaviors had on the nature of this record. Chapter 1 introduces the model, which takes the form of a flow diagram incorporating eight discrete behaviors – manufacture, distribution, prime use, reuse, maintenance, recycling, discard, and reclamation – that governed the passage of Roman pottery through its life cycle and its incorporation into the archaeological record. After Chapter 2 considers various topics that represent essential background information for the discussion that follows, Chapters 3 through 10 present systematic examinations of each of the eight behaviors included in the model, illustrating the nature of the evidence for these and the ways in which they operated through the discussion of examples drawn from the body of relevant textual, representational, material cultural (i.e., archaeological), and comparative evidence. The final chapter, Chapter 11, then synthesizes these observations, considering their implications for a broader understanding of material culture in the Roman world, identifying the individual and collective effects that the eight behaviors included in the model had on the nature of the Roman pottery record, and identifying directions for future research aimed at improving our understanding of the life cycle of Roman pottery and its implications for the Roman pottery record.

It is the author's hope that by presenting a general and systematic description of the behavioral system that governed the formation of the Roman pottery record, this study will serve to make students of Roman pottery more fully aware of the overall nature and scope of the challenge that faces us if we are to attain an adequate understanding of the sources of patterning in pottery data. Beyond this, by presenting detailed observations regarding the relationship between specific behaviors on the part of those who produced, distributed, and used pottery and the nature of the pottery record in those areas where we possess fairly good information, this study

will enable students of Roman pottery to approach the collection, analysis, and interpretation of pottery evidence in a somewhat more informed and sophisticated fashion than would otherwise be the case. Finally, by highlighting those areas where our understanding of these behaviors is either more limited or lacking altogether, this study will serve to indicate directions for future research aimed at improving our understanding of the nature of the Roman pottery record.

It is the author's hope that both the method employed in this study and some of its specific results will be of interest to scholars working outside the field of Roman pottery studies. Specifically, because, as already noted, pottery represents the most abundant category of Roman material culture available to us, some of the behaviors that can be documented in relation to its use and discard may be of interest to scholars concerned with broader issues in the production and use of material culture in the Roman world. In addition, because the body of evidence regarding the behaviors that governed the life cycle of Roman pottery and the formation of the Roman pottery record is substantially richer in many regards than that available for several other complex societies that are the object of archaeological investigation, this study may prove to be of interest to archaeologists and students of archaeological pottery more generally. In recognition of this second possibility, the author has adopted several descriptive conventions, which, although perhaps the source of some irritation to Romanists, will facilitate the use of this book by readers whose area of expertise happens to lie outside the Roman world.

One drawback to the generalizing approach adopted in this book is that it implicates a body of evidence so vast that no single researcher could possibly command anything approaching the whole of it. It is inevitable, then, that the evidence taken into consideration is weighted toward the areas of the author's own experience and expertise. This means that the preponderance of the archaeological evidence is drawn from the region of west central Italy and dates to the imperial period. More particularly, many of the illustrative examples employed belong either to the pottery assemblage from the Palatine East excavations in downtown Rome, a project for which the author serves as chief ceramics specialist, or to the pottery assemblage from the excavations at Piammiano, a small Etrusco-Roman settlement situated on the right bank of the Tiber River 80 kilometers to the north of Rome, probably to be identified as Roman Statonia, where the

author has served as co-director of research. In the area of textual evidence, the Latin sources are exploited more extensively than those in Greek and Late Hebrew/Aramaic. On account of these limitations, a substantial amount of relevant evidence has no doubt been overlooked.

In closing this brief introduction it may prove helpful to indicate some of the definitions and conventions employed in this study. The Roman world is defined as those regions under the political control of the Roman state from the late republic down to the end of the empire – that is, from roughly the second century B.C. to the sixth century A.D. The term pottery is understood to refer to ceramic containers and related items, including lamps. Items such as terracotta sculpture and architectural ceramics, including brick, tile, drain-pipes, vaulting tubes, and related items, such as terracotta sarcophagi, are thus excluded from consideration. All dates given are A.D. unless otherwise indicated. Settlements and geographical regions are generally referred to by their modern names, with the Roman-period name, when this is known, following in square brackets on the occasion of a locale's first mention in the text. The locations of all settlements and archaeological sites mentioned are shown in Maps 2–9 at the back of the book. The *regio* [quarter], *insula* [block], and doorway addresses conventionally assigned to structures at the sites of Pompeii, Herculaneum, and Ostia are presented in their full form on the occasion of a structure's first mention, rather than in the abbreviated fashion normally employed in the specialist literature. In the interest of facilitating the use of this book by non-Classicists and non-Semiticists, all passages in Latin, Greek, and Late Hebrew/Aramaic are accompanied by translations in English. All terms in these languages are also translated into English on the occasion of their first use, with those in Greek and Late Hebrew/Aramaic given both in Greek or Hebrew characters and in transliterated form, with the latter employed for all subsequent uses. All translations of texts in Latin and Greek are the author's, whereas the sources of translations of texts in Late Hebrew/Aramaic are indicated in the notes. Literary works in Greek and Latin are referred to by their full titles rather than by the standard abbreviations normally employed by Classicists. Citations of passages in Late Hebrew/Aramaic drawn from the rabbinic sources indicate both the division and tractate to facilitate the locating of these by readers not familiar with the organization of these works. Latin epigraphical texts are rendered according to the set of standard conventions employed for the *Corpus inscriptionum Latinarum* [*The Corpus of Latin inscriptions*, abbreviated

CIL] (Krummrey and Panciera 1980), with the exception that all texts produced on pottery (*graffiti*, *tituli picti/dipinti*, and stamps) are presented in uppercase letters, with the letter V employed in the place of U, ligatures indicated by rendering the relevant letters in boldface type, and letters of problematic reading indicated by underlining.

1

A Model of the Life Cycle of Roman Pottery



*The persons who produced, distributed, and used Roman pottery engaged in various actions that determined how, when, where, why, and in what condition and quantity pottery came to be incorporated into the archaeological record. It seems a reasonable assumption that, from the time of its manufacture through to the time of its incorporation into the archaeological record, a substantial portion of Roman pottery was subjected to these actions in a more or less regularly recurring order that may be thought of as constituting a sequence akin in certain regards to the life cycle of an organism. In consideration of this observation, this study employs as its organizing basis a general model of the life cycle of Roman pottery. This construct is of value in that it not only helps identify the various actions that governed the formation of the pottery record, here termed *behavioral practices*, but also elucidates the ways in which these worked individually and in concert with one another to do so. This chapter presents this model, discussing its conceptual basis, describing its general organization, defining its individual components, and considering its limitations.*

To construct a model of the life cycle of Roman pottery, this study takes the general model of the artifact life cycle – a conceptual scheme formulated by Schiffer in the early 1970s (Schiffer 1972: 157–60) that went on to gain wide acceptance in Americanist archaeology – and modifies this to take into account the specific set of circumstances relevant to Roman pottery. The general model of the artifact life cycle assumes that an artifact is normally subjected to a sequence of four distinct behavioral practices: *manufacture*, *use*, *maintenance*, and *discard*. Manufacture consists of the fashioning of an artifact from one or more raw materials obtained from nature; use is the utilization of an artifact for the purpose or purposes for which it was manufactured, followed in some instances by its use for some other purpose or purposes; maintenance involves the upkeep or repair of an artifact

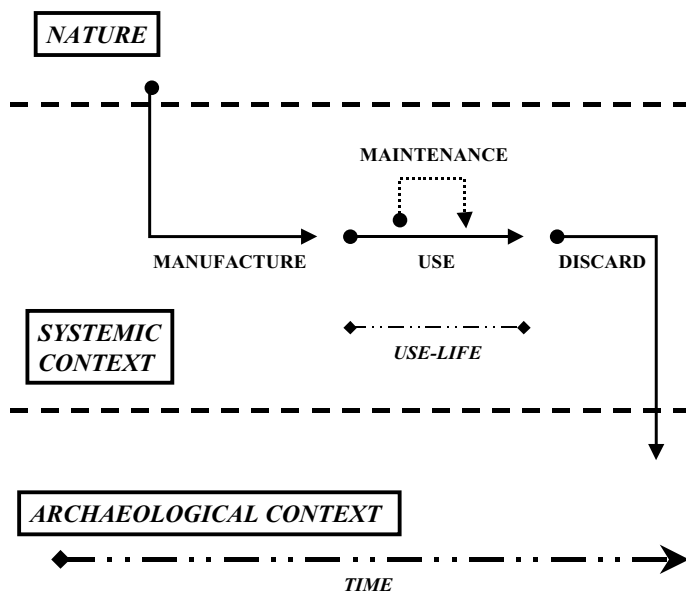


FIGURE 1.1. Flow diagram representing general artifact life cycle. After Schiffer 1972: 158. fig. 1.

so that it can continue to serve for the purpose or purposes for which it is being used; and discard consists of the abandonment of an artifact at the termination of its use. The amount of time that an artifact remains in use is generally referred to as its *use-life* (Mills 1989: 135–41; Shott 1989, 1996: 463–4). Maintenance is considered an optional practice, in that not all artifacts are regularly subjected to it. Following discard, durable artifacts are sooner or later incorporated into archaeological deposits, thereby becoming part of the archaeological record. In the terminology employed in formation theory – the body of concepts concerned with the processes involved in the formation of the archaeological record (Shott 1998) – this involves the passage of an artifact from the *systemic context*, that is, a situation in which it is involved in a human behavioral system, to the *archaeological context*, a situation in which following discard it is no longer involved in a human behavioral system (Schiffer 1972: 157; 1996: 4). This set of concepts can be expressed in the form of a simple flow diagram, as shown in Figure 1.1.

It is necessary to revise this scheme in several ways to obtain an adequate representation of the life cycle of Roman pottery. An additional behavioral practice, *distribution*, must be introduced between manufacture and use to

reflect the fact that nearly all Roman pottery was manufactured by specialist producers and came into the possession of those who used it by means of some more or less complex set of exchange mechanisms. The regularity with which vessels and vessel parts were employed for some purpose other than that/those for which they were manufactured at the conclusion of their use for this purpose/these purposes makes it useful – if not strictly necessary – to divide the use portion of the life cycle into two distinct practices: *prime use* and *reuse*. A second new behavioral practice, *recycling*, must be added to reflect the fact that vessels and vessel parts were regularly employed as a raw material in some manufacturing process at the conclusion of manufacture, distribution, prime use, or reuse. Finally, a third new behavioral practice, *reclamation*, must be introduced to accommodate the fact that vessels and vessel parts were sometimes retrieved following their discard for use in some reuse or recycling application.

This set of concepts can be expressed in the form of a second flow diagram, as shown in Figure 1.2. All of the behavioral practices other than manufacture are here represented as optional (i.e., by means of a dotted arrow), in that no single vessel was necessarily subjected to any one of them. Maintenance is shown as occurring in the course of manufacture, distribution, prime use, and reuse, whereas recycling and discard are represented as following on from any one of these same four behavioral practices. Reclamation is shown as leading to either reuse or recycling as a raw material. In recognition of the fact that vessels and vessel parts were regularly employed in recycling applications, the zone at the top of the figure, labeled *nature* in the flow diagram for the general model of the artifact life cycle, has been relabeled as *raw material*. Finally, two distinct lines are presented for use-life – one for prime-use use-life, and one for reuse use-life. Readers will doubtless find it helpful to refer back to this somewhat complicated diagram on various occasions in the course of the chapters that follow.

It will prove useful at this juncture to provide an explicit definition for each of the eight behavioral practices included in the revised model:

Manufacture: The fabrication of a vessel from one or more raw materials.

Distribution: The physical transfer of a newly manufactured vessel from those who manufactured it to those who will use it.

Prime use: The use of a vessel for the application or applications for which it was manufactured.

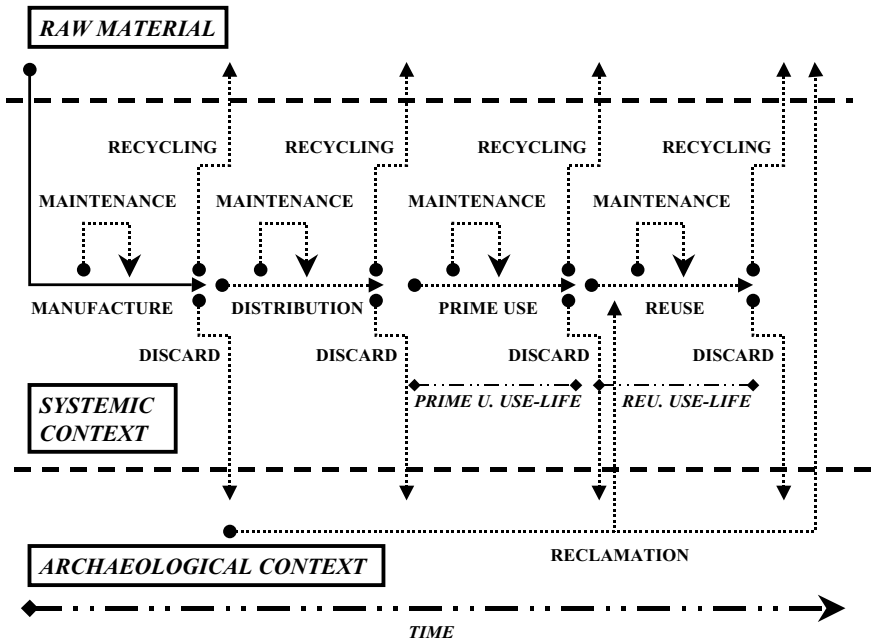


FIGURE 1.2. Flow diagram representing the life cycle of Roman pottery.

Reuse: The use of a vessel or a vessel part for some application after the conclusion of its use for its prime-use application.

Maintenance: The upkeep or repair of a vessel so that it can continue to perform some application.

Recycling: The use of a vessel or a vessel part as a raw material in a manufacturing process.

Discard: The deliberate and voluntary abandonment of a vessel or a vessel part by those using it with the intent of no longer using it.

Reclamation: The acquisition of a vessel or a vessel part after its discard.

Some of these definitions require further discussion to clarify the nature of the practices to which they refer.

1.1 / Prime Use and Reuse

The division of use into prime use and reuse, although helpful for certain elements of the discussion that follows, is to some extent problematic, in that it is based on two simplifying assumptions. First, there is no way of

ascertaining either the extent to which Roman potters had assumptions regarding the ways in which the vessels that they manufactured would be used, or the extent to which those who acquired newly manufactured vessels actually employed them for these purposes.¹ To take some account of this problem, one may wish to expand the definition of prime use to include an alternative definition, as follows: The use of a previously unused vessel for the application or applications for which it was acquired. Second, the assumption that the use-life of every vessel was marked by a specific moment at which it was retired from use for its prime-use application or applications (henceforth application), thereby setting the stage for its use for some new application that should be regarded as an expression of reuse, is no doubt a simplification and, to some extent, a misrepresentation of what were actual patterns of pottery use. In some cases the boundary between prime use and reuse was likely a fuzzy one, with a vessel coming to be employed for some new and different application while it continued to be used for its prime-use application, with the one perhaps eventually coming to replace the other.

In some instances the disposition of a vessel in the context either of a prime-use application or of a reuse application effectively removed it from contact with or manipulation by people. As examples of this phenomenon one may cite the placing of a vessel in a tomb as a grave offering or the incorporation of a vessel into a structure such as a drainage feature. In instances of this kind, although the vessel was still in a technical sense being used, it had, in effect, been removed from the systemic context. Whereas Schiffer considers instances of this kind to represent discard (Schiffer 1996: 80–89), they are here regarded as constituting expressions of prime use or reuse, with the general phenomenon referred to as *depositional use*.

This study recognizes three distinct types of reuse as determined by the nature of the application and whether or not it involved any physical modification to the original vessel. These three types of reuse, here termed Type A, Type B, and Type C for ease of reference, are as follows:

Type A: Reuse involving an application similar to the vessel's prime-use application without any physical modification to it.

Type B: Reuse involving an application different from the vessel's prime-use application without any physical modification to it.

Type C: Reuse involving an application different from the vessel's prime-use application involving physical modification.

Although readers may wonder why instances of Type A reuse are not simply regarded as representing prime use, the acknowledgment of cases of this kind as a form of reuse allows the recognition of practices that involved the use of vessels manufactured or initially acquired to serve their prime-use application for a finite number of episodes beyond the span of their intended use-life. In the Roman case, it is particularly useful to be able to make this distinction with regard to *amphorae* – packaging containers that were probably in most cases manufactured to serve for a single episode of use.

In some instances vessels suffered a production defect during the manufacturing process or damage during the course of distribution of a sort that rendered them unsuitable for use for their intended prime-use application. Although most of these vessels were probably disposed of by means of recycling or discard, some were presumably employed for an application different from their intended prime-use application. In cases of this kind the vessel is considered to have passed directly from manufacture or distribution to reuse, without being subjected to prime use.

1.2 / *Maintenance*

The various operations subsumed under maintenance include both those concerned with the routine upkeep of a vessel, such as the washing of a cookpot following its use, and those involving the repair of nonroutine damage, such as the reattaching of a handle that broke away from a vessel when it was accidentally dropped. Whereas operations of the first kind presumably were carried out by and large in the course of prime use, those of the second kind were likely undertaken in the course of manufacture, distribution, prime use, and reuse.

1.3 / *Recycling*

In recycling, the artifacts and artifact parts employed as raw material in a manufacturing process lose their original identity (Schiffer 1996: 29–30). By way of illustration, an artifact manufactured in glass can be melted down, mixed with molten glass derived from one or more other artifacts, and then formed into an entirely different class of object. The possibilities for operations of this kind are more circumscribed in the case of pottery, because a ceramic paste that has been transformed into a ceramic body through firing cannot be returned to a plastic state for forming into a new object. Fragments of pottery can, however, be employed as inclusions or filler in a compound artifact (e.g., a concrete wall), and applications of this kind are here classified

as instances of recycling in cases where the utility of the pottery fragments employed in the operation derived entirely from their volume and/or from the fact that their presence promoted a particular chemical reaction rather than from some specific morphological characteristic that harked back to the form of the vessel to which they originally belonged.

1.4 / *Discard*

Discard, as here defined, excludes occurrences such as the accidental loss of a ceramic vessel or the abandonment of ceramic vessels in the context of the more general abandonment of the locus of their use or storage.

Artifacts and other substances such as human and animal waste that have been marked for discard are here referred to as *refuse*, with those discarded at the location of their use, storage, or generation termed *primary refuse*, and those moved from the place of their use, storage, or generation to some other location for abandonment termed *secondary refuse* (Schiffer 1972: 161–2, 1996: 58–64). The discard of secondary refuse frequently involves its transfer from the place where it is generated to the locus where it is abandoned in a series of discreet steps (Deal 1985; Needham and Spence 1997: 77–8), with this flow of material termed a *waste stream* (Schiffer 1996: 66). In many cases, artifacts that have been retired from prime use are subject to what is termed *provisional discard*, that is, temporary caching at or near the locus where they are used or stored so that they can either be appropriated for reuse or recycling as may prove expedient or transferred to some other location for abandonment at some later time (Deal 1985: 253–9; Kamp 1991: 25; Schiffer 1996: 66).

The incorporation of durable artifacts and artifact parts that have been discarded into an archaeological deposit is not instantaneous, but rather may be considered to have occurred after the passage of some period of time. For the purposes of this study this is considered to correspond to the period during which there are living persons who possess direct knowledge of the act of abandonment, either because they undertook it themselves or because they witnessed it. The period of time falling between the abandonment of an artifact or artifact part and its incorporation into an archaeological deposit is here termed its period of *abandonment deposition*.

1.5 / *Reclamation*

Vessels or vessel parts may be reclaimed either from abandonment deposition or from an archaeological deposit and employed for some reuse or recycling application (Schiffer 1996: 106–11). In cases in which vessels or vessel parts

are employed for a reuse application, they reenter the systemic context. Readers should note that for ease of representation the flow diagram in Figure 1.2 depicts reclamation as operating exclusively on materials that have been incorporated into an archaeological deposit, ignoring the phenomenon of reclamation from abandonment deposition.

It should be emphasized that not all Roman pottery passed through the complete life cycle. As already noted, some vessels were employed in depositional use applications that saw them effectively removed from further involvement in the systemic context. In other instances, vessels were accidentally lost during the course of their use-life. As examples of this second phenomenon we may cite vessels being used on board a ship that were swept over the side in a storm, or water jars that were dropped down a well. In other cases, vessels were abandoned in the context of the more general abandonment of occupation of the locus where they were being used or stored (Cameron and Tomka 1993).² In some cases this would have been a gradual and/or planned abandonment, as may have occurred, for example, when a family migrated from the countryside to a town for economic reasons, whereas in others it would have been a sudden and/or unplanned abandonment, as frequently occurred in the case of shipwreck, military attack, or a natural disaster, such as an earthquake or a volcanic eruption (Joyce and Johannessen 1993: 139).

The model for the pottery life cycle employed in this study embodies certain limitations. Specifically, it must be acknowledged that it does not recognize several factors that played an important role in the formation of the Roman pottery record and that certain of the assumptions on which it is based have been subject to significant criticism by archaeologists and/or students of material culture. On the first of these two counts, it should be acknowledged that by focusing exclusively on human behavioral practices deliberately directed at the manufacture and use of pottery, the model fails to take account of certain human practices (e.g., construction work, plowing) and various nonhuman factors (scavenging and burrowing by animals, the decomposition of organic refuse, wind and water erosion) that generally play roles of considerable significance in the formation of the archaeological record. These factors are, of course, of considerable importance to any effort to understand the nature of the Roman pottery record, and the synthesizing discussion presented in the concluding chapter does take some account of them. It should also be noted that the model does not extend the pottery life cycle to include the re-entry of pottery into the systemic context in the form of archaeological finds, relics, curiosities, and so forth in post-Roman times.

Although this phenomenon raises issues of some archaeological interest, these are not the focus of the present study, and this phenomenon is not therefore incorporated into the model.³

On the second count, it must be acknowledged that certain members of the post-processual/contextual school of archaeology have argued that the general model of the artifact life cycle on which the model is based and, more broadly, certain of the basic assumptions made by the Schifferian/formation processes school of archaeology of which it is a product represent significant misunderstandings or distortions of the nature of material culture, the relation between human beings and material culture, and the practice of archaeology.

The most extended critique of this kind was presented by Thomas in his book *Time, culture and identity: an interpretive archaeology* (Thomas 1996: 55–64), and it is worth considering – if only briefly – the main points of Thomas’ critique and responding to these. The main elements of Thomas’ critique can be stated as follows:

1. The formation processes school wrongly assumes the existence of a sharp distinction between nature and culture.
2. The formation processes school wrongly conceives of the archaeological record as being akin to the fossil record, whereas it is more fruitful to consider it as being similar to a text, in that it contains encoded information, is the object of interpretation, and is susceptible to multiple interpretations.
3. Human beings retain ongoing relationships with material culture from the past, and artifacts do not therefore “die,” passing from a systemic context to an archaeological context, as is assumed to be the case by the formation processes school.

The first of these three points is largely a product of Thomas’ mistaken assumption that the site formation process school regards discarded material culture as somehow returning to nature, with the archaeological record, in effect, a part of nature, and need not be of particular concern to us. The second is also of little consequence, as it reflects a set of understandings that is at present widely accepted in one form or another within archaeology and that does not, in and of itself, represent any fundamental difficulties for a life-cycle approach to the evaluation of material culture. The third point, in contrast, does have clear implications for the approach employed in this study, and for this reason merits some consideration.

Thomas' point that human beings regularly retain ongoing relationships with material culture from the past reflects a view that is widely accepted and, in its general outlines, at least, completely uncontroversial in contemporary archaeology.⁴ Although this phenomenon is both interesting and of some significance for an understanding of material culture, it is the author's view that Thomas greatly exaggerates its importance. Specifically, although it is easy enough to agree with Thomas that an item of material culture such as Stonehenge – a continuously visible, highly conspicuous, unique, and inherently evocative monument – has retained a place in the consciousness of many people over the millennia since human beings ceased to employ it for the purposes for which it was originally constructed, it is quite another thing to make a claim of this kind for the other example of material culture that he chooses to adduce in connection with his argument – conveniently for this study – a sherd of pottery recovered in the excavation of a Roman villa. Although such a sherd most certainly does have a number of potential meanings in various spheres in the contemporary world (e.g., scholarly, popular, legal), on the day prior to its excavation by archaeologists, because no person is at that time aware of its specific existence, it cannot reasonably be said to actually have any of those meanings. Thomas, himself, seems to acknowledge this fairly obvious point, when he states, "When we undertake archaeological analysis, what we are doing is taking some part or parts of the material world out of the continuous stream of history and constituting them as objects" (Thomas 1996: 62). To employ the fact that certain items of material culture continue to operate within a behavioral system long after they have been abandoned by those who originally produced and used them (or are reintroduced into behavioral systems one or more times) to obscure the fact that a great deal of preserved material culture does not continue to operate in this way, and, following on from this, to dismiss the distinction between systemic context and archaeological context as an archaeologically useful concept strikes the author as disingenuous.

The model for the life cycle of Roman pottery presented in this chapter is not without certain weaknesses. Among other things, in the interest of representing a neat, regular, systematic scheme, it embodies assumptions that simplify complex and, to some extent, interesting realities, as is the case, for example, with the distinction drawn between prime use and reuse. Again, some of the concepts that it embodies, such as depositional use and abandonment deposition, are defined on the basis of assumptions that may be regarded as open to question. Given these defects, it is important for

readers to keep in mind that this model is not here presented as a definitive representation of what was doubtless a highly complex and somewhat messy set of past realities, but rather as a heuristic device designed to facilitate the consideration of the various practices that governed the formation of the Roman pottery record.

In the chapters that follow an effort is made to illustrate the nature of the eight behaviors included in the model and the ways in which these governed the passage of pottery through the life cycle and its incorporation into the archaeological record. The three behaviors that constitute the initial part of the life cycle – manufacture, distribution, and prime use – played only a limited role in the incorporation of pottery into the archaeological record and are accordingly provided a somewhat abbreviated treatment that focuses primarily on those aspects that are of interest from this point of view. The other five behaviors – reuse, maintenance, recycling, discard, and reclamation – played a more salient role in the incorporation of pottery into the archaeological record and, as the evidence allows, are treated in a more comprehensive fashion. The aim is to provide as full an exposition as possible of those aspects of the behaviors treated, drawing on the fullest possible range of evidence. This naturally results in a generalized and composite picture not strictly applicable to any one specific time or place. It also results in a highly uneven exposition, with some aspects of some behaviors for which there is little evidence being noted in passing with but a sentence or two, whereas others, for which there happens to be a rich body of evidence, are discussed at considerable length. Again, in some instances, specific evidence is discussed in a considerable degree of detail where this seems useful.

2

Background Considerations



Before advancing to a consideration of the eight behavioral practices incorporated into the model described in the preceding chapter it is necessary to consider three topics that represent essential background information: the forms of evidence available for the examination of these practices, the different functional categories of Roman pottery, and the economic value of Roman pottery.

2.1 / *Forms of Evidence*

Four different forms of evidence provide information regarding the behavioral practices here under consideration: textual, representational, material cultural, and comparative.

2.1.1 / *Textual Evidence*

The textual evidence pertaining to the practices under consideration can be assigned to three distinct categories: documentary, epigraphic, and literary. Documentary evidence consists of texts that were produced for record keeping and similar purposes.¹ In the case at hand, these comprise almost exclusively *papyri* from Roman Egypt, for the most part of imperial date and written in Greek. Epigraphic evidence, in turn, consists of texts inscribed in stone or some other durable material for purposes of public display. Literary evidence consists of texts composed for circulation to a broad readership.

Some of the literary texts that are of particular importance for this study warrant specific mention. *De re coquinaria*, a compilation of recipes probably drawn up during the fourth century and attributed to the first-century cook Apicius, provides a wealth of information regarding the ways in which pottery was used in connection with food preparation activities. The *Digesta*, a compilation of legal opinions composed by Roman jurists between the first century B.C. and the third century that was drawn up in the A.D. 520s, preserves important information regarding a variety of subjects relevant to the topics under consideration.² The four surviving Latin treatises on farm

management, namely Cato's *De agri cultura*, Varro's *De re rustica*, Columella's *De re rustica*, and Palladius' *Opus agriculturae*, which date to the second century B.C., the first century B.C., the first century, and the fourth century, respectively, provide much useful information regarding the ways in which pottery was used and maintained in connection with agricultural activities. Also a useful source of information on these topics is the *Geoponica*, a tenth-century compilation in Greek drawing on an array of agricultural treatises dating primarily to the Roman imperial period. Several technical treatises regarding land surveying composed during the imperial period by authors referred to collectively as the *agrimensores* provide useful glimpses into practices of the reuse and discard of pottery in the Roman countryside. Finally, the rabbinic sources – texts concerned with questions of Jewish law composed partly in Late Hebrew and partly in Aramaic between the second and the sixth century, including the *Mishnah*, the *Tosephta*, the *Talmud Yarushalmi*, and the *Talmud Babli* – provide important insights into the use, reuse, and maintenance of pottery among the Jewish segment of the empire's population.³ Scattered references to the use, reuse, maintenance, recycling, discard, recovery, and reclamation of pottery occur elsewhere in the surviving corpus of Latin literature and Greek literature of the Roman period.⁴

2.1.2 / *Representational Evidence*

The representational evidence pertaining to the practices here under consideration consists of a small number of fresco paintings, mosaics, and reliefs from the Roman world that contain scenes depicting the reuse and maintenance of pottery.

2.1.3 / *Material Cultural Evidence*

The material cultural (archaeological) evidence pertaining to the practices under consideration consists of Roman pottery and other relevant material remains, including the structures, facilities, and portable artifacts with which pottery may be associated and the preserved contents of pottery vessels.

The pottery evidence may be thought of as consisting of three distinct kinds: pottery from use-related contexts, pottery from discard contexts, and pottery irrespective of its context. Turning to the first of these, pottery from use-related contexts – that is, pottery recovered in the location in which it was being used or stored – is of particular importance, since it is frequently possible to infer what a vessel was being utilized for on the basis of its

association with other artifacts or features or due to the preservation of its contents. In some cases evidence of this kind permits one to determine that an unmodified vessel was being employed for some purpose other than its prime-use application or the specific reuse application for which a modified vessel was being employed. Many contexts of this kind come from sites abandoned due to some catastrophic event and subsequently subjected to little postabandonment disturbance. The examples that come most readily to mind are, of course, the sites buried by the eruption of Mount Vesuvius in A.D. 79, including the towns of Pompeii and Herculaneum and several villas located in their environs (henceforth referred to collectively as *the Vesuvian sites*) (de Vos and de Vos 1982), and much of the pottery evidence cited in this study originates at these sites. Other examples include sites abandoned due to military action, such as the Cave of Letters in Israel (Yadin 1963), sites destroyed either by fire, such as the Caseggiato dei Molini (*Regio* 1, *Insula* 3, doorway 1) at Ostia (Bakker 1999: 16–60, 145–64), or by earthquake, such as the town of Kourion on Cyprus (Soren 1988; Soren and James 1988), open-water shipwrecks (Parker 1992a), and in-harbor ship sinkings, such as the several vessels recently unearthed at San Rossore, near Pisa (Bruni 2000). Given the potential importance of evidence of this sort, it is indeed unfortunate that only a limited number of sites of this kind have been subject to both careful excavation and comprehensive publication.

Pottery from discard contexts may also shed light on the practices that governed the formation of the Roman pottery record. Specifically, by studying the relative representation of specific forms, wares, or vessel parts, it is sometimes possible to draw inferences regarding the ways in which pottery was used, recycled, and/or discarded (Schiffer 1996: 19).

Finally, Roman pottery may provide evidence regarding the practices involved in its use and maintenance regardless of the context of its recovery. Thus, a pot or portion of a pot may bear evidence of modifications undertaken in connection with its repair or reuse, such as the drilling of holes for the insertion of a lead clamp or the removal of the rim and neck for conversion from a jar to a basin. Similarly, abrasion of a vessel's surface and the deposition of incrustations on it may provide evidence for its prime-use or reuse application. Finally, texts, either scratched into or painted onto a pot, known as *graffiti* and *tituli picti* (the latter also termed *dipinti*), respectively, may provide evidence for its reuse, as when a wine *amphora* was provided with a text indicating that it was filled with wine on more than one occasion

or that it was at some point employed for the storage of a substance other than wine.

2.1.4 / *Comparative Evidence*

This term is here used to refer to evidence regarding the use, reuse, maintenance, recycling, discard, and reclamation of pottery in cases other than the Roman one.⁵ Ethnographic, ethnohistoric, ethnoarchaeological, and archaeological information of this kind may alert the researcher to archaeological evidence relevant to understanding the processes here under consideration and provide insights that assist with the interpretation of this evidence.

2.2 / *The Functional Categories of Roman Pottery*

For the purposes of this study the corpus of Roman pottery is divided into six more or less distinct categories on the basis of a vessel's assumed prime-use application. These categories (henceforth referred to as *functional categories*) are as follows:

dolia (singular: *dolium*): extremely large fixed or semifixed jars (capacity ca. 400–3000 l) employed for the storage of wine, olive oil, or grain (Figure 2.1);⁶

amphorae (singular: *amphora*): portable jars/jugs (capacity ca. 6–150 l) employed for the packaging, distribution, and postdistribution storage of foodstuffs, chiefly wine, olive oil, processed fish products, and fruit (Figure 2.2);⁷

lamps: small vessels employed for lighting (Figure 2.3);

cookwares: vessels employed for the cooking/heating of food and drink (Figure 2.4);

utilitarian wares: vessels employed for the preparation or storage/containment of food, drink, and various other substances (e.g., unguents and perfumes, paint pigments, urine, feces) (Figure 2.5);

tablewares: vessels employed for the serving or consumption of food and drink (Figure 2.6).

Although distinct vessel forms were manufactured for a wide variety of prime-use applications not embraced by this scheme (e.g., incense burners, inkwells, lamp fillers, dice cups, coin banks, dwellings for doormice,



FIGURE 2.1. Representative *dolium*. Photo: JTP.

beehives, planters, funnels, crucibles), these forms are negligible from a quantitative point of view and need not be of particular concern. The final two categories indicated above – utilitarian wares and tablewares – are somewhat problematic, in that it is sometimes difficult to determine to which of these two one should assign a specific form, and in some cases a single pottery class includes some forms that should be assigned to one category and some that should be assigned to the other. It should also be noted that the tableware category embraces both the various classes of gloss-slipped ware (e.g., Black Gloss Ware, Italian, Gallic, and African *Sigillata*), which are often regarded by scholars as constituting a distinct grouping by themselves (frequently referred to as “finewares”), and various other classes.⁸ Given these difficulties, a good case could be made either for the combining of tablewares and utilitarian wares into a single category, or for the subdivision of tablewares into two distinct categories, namely high-end gloss-slipped wares and other classes.



FIGURE 2.2. Representative *amphorae*. Top: Dressel 2–4 *amphora*. Ciarallo and De Carolis 1999: 133 no. 110; courtesy Ministero per i Beni e le Attività Culturali. Bottom left: Dressel 20 *amphora*. Bost et al. 1992: planche XIVc. Bottom right: Late Roman 5 *amphora*. Hayes 1976: 124 no. 361. With permission of the Royal Ontario Museum © ROM.



FIGURE 2.3. Representative lamps. Ben Abed Ben Khader and Soren 1987: 119 fig. 51.

Much of the evidence considered in this study concerns the *amphorae* functional category, and some more extensive comments regarding the use of the vessels belonging to this category will prove useful at this juncture. This functional category subsumes a wide array of morphologically distinct forms, here referred to as *classes*. Each of these classes was generally manufactured in a single, more or less extensive geographical region and is, on this account, normally attested in one or, at most, a limited number of distinct fabrics. The evidence suggests that in most cases the vessels belonging to a specific class were normally employed for the packaging, distribution, and postdistribution storage (henceforth referred to as *packaging*) of a single, specific substance, here referred to as that class's *principal content*. As mentioned above, the evidence indicates that the range of substances packaged in *amphorae* as their principal content was for the most part restricted to four different categories of foodstuffs: wine [*vinum*] and wine-related products, including sweetened wine [*mulsum*], vinegar wine [*acetum*], must [*sapa*], and

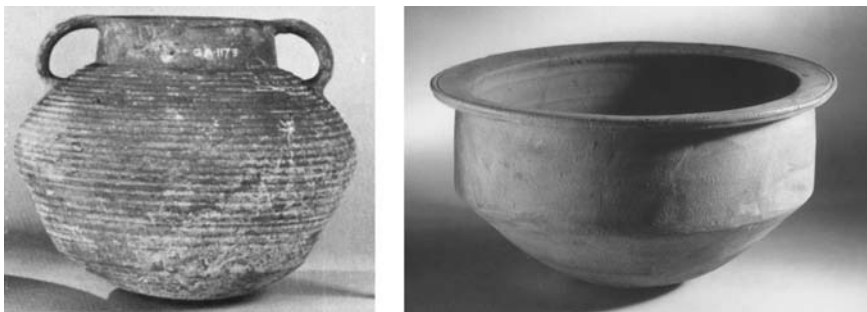


FIGURE 2.4. Representative cookware vessels. Left: Palestinian Cookware cookpot. Hayes 1976: 119 no. 288. With permission of the Royal Ontario Museum © ROM. Right: Campanian Cookware casserole. Ciarallo and De Carolis 1999: 167 no. 184; courtesy Ministero per i Beni e le Attività Culturali.

various types of cooked or concentrated must [*caroenum*, *defrutum*, *decoctum*]; olive oil [*oleum*]; processed fish products, including both salted fish preserves [*salsamentum*] and various kinds of fish sauce [*garum*, *liquamen*, *allec*, *muria*]; and certain varieties of fruit, including cherries [*cerasi*], apples [*mala*], and dates [*palmulae*].

There are exceptions to each of the statements just made about *amphorae*, and it should be appreciated that these are simplifying characterizations of what was a considerably more complex (and, at present, only partially understood) reality. Thus, the family of morphologically similar containers



FIGURE 2.5. Representative utilitarian ware vessel. *Mortarium* with pestle and stamp. Greene 1992: 11 fig. 3; © Trustees of the British Museum.



FIGURE 2.6. Representative tableware vessels. Left: African *Sigillata D* vessels. Ben Abed Ben Khader and Soren 1987: 119 fig. 52. Right: pitcher. Ciarallo and De Carolis 1999: 166 no. 182; courtesy Ministero per i Beni e le Attività Culturali.

generally referred to as the Dressel 2–4 *amphora* was manufactured in several different regions scattered across both the eastern and the western Mediterranean. With regard to principal content, the Richborough 527 *amphora* appears to have been employed mainly as a container for alum (Borgard 1994: 198; Borgard and Cauaher 2003), whereas stamps indicate that *amphorae* of some yet-to-be-identified class were manufactured in Calabria expressly for the packaging of pitch (De Caro 1985: 29–32). The African 2 *amphora*, on the other hand, may have been employed on a regular basis for the packaging of both fish products and olive oil. Again, it seems likely that newly manufactured containers belonging to classes of *amphorae* generally employed for the packaging of wine, oil, fish products, or the three different fruits noted above were on some occasions utilized for the packaging of some other substance. In particular, there is evidence that certain other foodstuffs, including honey, nuts, cabbages, and grains, as well as nonfood substances, such as pitch, resin, and gum, were in at least some instances, and perhaps regularly, packaged in *amphorae*. There is also evidence that some classes of *amphorae* manufactured in southern France, such as the Dressel 9 and 10 *similis amphora* and some variants of the Gallic 4 *amphora*, were produced for the repackaging of Spanish products and Italian wine, respectively, that were shipped to France in some other sort of container (Desbat 2003: 49). Finally, there is reason to believe that some newly manufactured *amphorae* were employed not as packaging containers, but rather as storage jars or for some similar application.

Several classes of *amphorae* were occasionally or regularly provided with one or more labels written in red or black paint, termed *tituli picti*, usually in the neck/shoulder area. These texts, which generally differ in their structure and content from class to class and, not infrequently, within a class, may indicate the identity and/or the point of origin of the container's content, the quantity of the content measured in terms of weight or volume, the year in which the container was filled, and/or the name of one or more individuals involved in the container's distribution. They are often poorly preserved, and in many cases are composed largely of cryptic abbreviations, rendering their transcription, expansion, and interpretation problematic. In most cases *tituli picti* were probably what may be thought of as packaging labels, that is, labels that recorded information of interest to persons concerned with the distribution of the *amphora* and its content. In instances in which two or more packaging labels appear on a single vessel, each may have been produced in association with a different stage in what was a complex distribution process. At the same time, it should be pointed out that *amphorae* were sometimes used or reused as storage jars, and in some cases, particularly those in which the text was limited to the identification of the container's content, it seems possible that a *titulus pictus* represented what may be thought of as a storage label, that is, one that served simply to facilitate the identification of the vessel's content when it was being employed in a storage capacity.

Because the large number of *amphora* classes referred to in this study will no doubt prove confusing to nonspecialists, an appendix at the back of the volume provides a summary of the basic information regarding each of these, including provenience, date range, and principal content.

In considering the use of pottery in the Roman world, it should be kept in mind that containers manufactured in one or more other materials were employed for most of the applications for which pottery was utilized. Thus, wooden casks were sometimes employed for the bulk storage and packaging of wine, and both wine and olive oil were sometimes packaged in skin containers. Oil lamps were also manufactured in blown glass, stone, cast bronze, and, in rare instances, gold and silver, whereas vessels fashioned in sheet bronze, lead, iron, and, in a limited number of regions (e.g., northern Italy, the Red Sea littoral), soapstone (talcoschist or steatite) were regularly employed for the cooking/heating of food and drink. Finally, containers in various organic materials (wood, leather, horn, basketry, cloth), several metals and metal alloys (copper, lead, silver, gold, bronze, pewter), different types of stone (alabaster, marble, limestone, vesiculated lava, talcoschist), and

synthetic materials (glass, faience) were used to fulfill some of the functions carried out by utilitarian wares and tablewares.

2.3 / *The Economic Value of Roman Pottery*

The economic value of Roman ceramic vessels presumably played a significant role in determining the ways in which they were subjected to certain of the practices here under consideration. Specifically, Romans were presumably more readily disposed to undertake maintenance operations in order to enable a pot to continue to serve its prime-use application or to employ it for some reuse application when it was a vessel of relatively great economic value. Conversely, they were presumably more readily inclined to retire a pot from prime use or reuse and to dispose of it by means of recycling or discard when it was a vessel of only slight economic value.

Pottery has generally been a low-cost good in societies that have manufactured it on a routine basis, and the small amount of pricing evidence available from the Roman world confirms the assumption that it was thus in the Roman case.⁹ The only internally coherent set of pottery prices available from the Roman world is contained in the so-called *Edictum Diocletiani et collegarum de pretiis rerum venalium* (henceforth *Edictum de pretiis*), a decree issued in A.D. 301 that established maximum prices for a wide variety of goods and services across the whole of the empire.¹⁰ A review of this evidence is informative, in that it suggests the general scale of the price differentials that likely characterized several of the functional categories of pottery described in the preceding section. The relevant section of the document, headed *De fictilibus* ("For Ceramics") (*Edictum de pretiis* 15.88–101), includes the following set of five price entries (15.97–101):

<i>Doleum Italicorum s(extariorum) mill[e?]</i>	X mille
<i>Vasum fictile Italicor(um) s(extariorum) duo[rum]</i>	X duobus
<i>Lucernas fictil<es n(umero)> de[cem]</i>	X quattuor
<i>Lagoenam s(extariorum) vi[ginti quattuor?]</i>	X duodecem
<i>Cetera vascula pro ratione [capacitatis distrahi debebunt?]</i>	
[<i>Dolium</i> with a capacity of 1000 (?) Italian <i>sextarii</i> ;	1000 <i>denarii communes</i>
Ceramic vessel with a capacity of 2 Italian <i>sextarii</i> ;	2 <i>denarii communes</i>
Lot of 10 (?) ceramic lamps;	4 <i>denarii communes</i>
<i>Lagona</i> with a capacity of 24 (?) Italian <i>sextarii</i> ;	12 <i>denarii communes</i>
Other vessels: price to be determined by a reckoning of their capacity (?)]	

Although gaps in the text create uncertainties regarding certain points of detail, the overall nature of the pricing scheme that the document prescribes for pottery is nonetheless sufficiently clear. The compilers imposed a simple,

uniform structure for what was a highly variegated category of craft goods, setting maximum price as a function of vessel capacity. A small, two-*sextarius* (1.1 l) capacity vessel was assigned a maximum price of two *denarii communes* (an amount equal to the smallest price figure employed in the decree) for a price-to-capacity ratio of one *denarius communis* per *sextarius* of capacity. For a *lagona* (jug) with a capacity that should probably be restored as 24 *sextarii* (13.1 l) (and which must, in any event, lie in the range of 20–29 *sextarii*, that is, 10.9–15.9 l), the ratio is set at one *denarius communis* for each two *sextarii* of capacity. Because the term *lagona* was regularly employed to refer to the small, flat-bottomed *amphorae* that were a common type of wine container during the period when the decree was composed (Peña 1999: 71–86), this entry should perhaps be understood as one included for the purpose of establishing a pricing criterion for *amphorae*. Although the lower price-to-capacity ratio expressed in this entry may have been intended to recognize economies of scale that could be realized in the manufacture of large vessels, it probably reflects the fact that, as discussed in Section 6.3, jugs and similar containers generally sold at relatively depressed prices due to the widespread availability of used *amphorae*. For a *dolium* with a capacity of 1,000 *sextarii* (547 l), the maximum price is set at 1,000 *denarii*, for a price-to-capacity ratio equal to that of the two-*sextarius* capacity vessel, that is, one *denarius communis* per *sextarius*. This price represents a very considerable amount of money, equal, for example, to the maximum price set in this same document for 10 *modii* (87 l) of wheat (*Edictum de pretiis* 1.1). At the other end of the spectrum, lamps, very small items that were mass produced in molds, were priced by lots of ten, with the maximum price for each lot set at just four *denarii communes*.

Additional pricing evidence indicates that, as one might expect, *amphorae* were valued at only a small fraction of their content. The *Edictum de pretiis*, for example, sets prices of 8, 16, 20, 24, and 30 *denarii communes* for one *sextarius* of various grades of wine (*Edictum de pretiis* 2.1–19), meaning that a 24-*sextarius* *lagona*, when filled with wine, would have been worth between 1/60 and 1/16 (1.67–6.25 percent) of its content. The Heroninos archive, a set of *papyri* pertaining to the administration of a large agricultural estate in the Theadelphia nome (administrative district) of Egypt during the 250s, furnishes data that indicate a generally similar picture. In this case, the documents demonstrate that wine *amphorae* were wholesaled at prices equal to between 0.5 and 1.3% of the wholesale cost of the wine destined to be packaged in them (Rathbone 1991: 167).

Although there is no pricing information that demonstrates that gloss-slipped tablewares were significantly more costly than other classes of pottery, other categories of evidence indicate that this was very likely the case. In the first instance, the special finishing that these wares received, the attention accorded to the execution of their stamped, incised, and/or molded decoration, the ongoing introduction by the workshops that manufactured them of new forms and decorative patterns, the practice in these workshops of mimicking the forms of vessels produced in metal, and the application of maker's marks all combine to suggest that these classes were regarded by their users as appropriate vehicles for social display, thus items for which consumers would have been disposed to expend larger amounts of money than for vessels belonging to other classes.

The few efforts that have been made by archaeologists to document differences in the value that consumers actually attributed to different categories and/or classes of pottery as evidenced by differentials in the incidence of pronounced use wear, repair, and/or the marking of ownership further indicate that gloss-slipped tablewares were treated differently and apparently valued more highly than other classes of pottery. It may prove informative at the present juncture to review some of the evidence for differentials in the marking of ownership among the different functional categories, while deferring a consideration of that for differentials in patterns of use wear and the incidence of repair to the chapters devoted to prime use and maintenance, respectively.

Post-cocturam graffiti, that is, texts and alphabetic signs scratched into a vessel subsequent to its firing, occur with a certain frequency on Roman pottery.¹¹ Although some of these markings consist of a complete sentence, in the vast majority of cases they are limited to a personal name, frequently in the genitive (possessive) case, an abbreviation of a personal name, a single letter, or a device, such as a cross, triangle, or star. Some of the longer texts clearly served to indicate either the owner or owners of the vessel on which they appear or the person or persons entitled to use the vessel,¹² and it seems a fair assumption that the bulk of the shorter texts and alphabetic signs were also created for this purpose. The desire to mark ownership presumably reflected a sense that the vessel (or, in the case of *amphorae*, jars, and similar forms, the vessel and/or its content) was an object of value that it would be costly and/or inconvenient to replace.

If this last assumption is correct, the study of the distribution of *graffiti* over the various functional categories and/or classes across either a site or a region

may shed light on differentials in the perceived economic value of these categories of vessels and how these varied by context (e.g., building or site type) and period. The only comprehensive study of this kind undertaken to date is Evans' analysis of a corpus of ca. 400 vessels bearing one or more *post-cocturam graffiti* recovered at a large number of excavated sites across Britain (Evans 1987). Evans began by classifying the vessels by several attributes, including text type (personal name, number, vessel content, other), region (Scotland, Hadrian's Wall, North, Wales, Midlands, East Anglia, Southwest, Southeast, London), site type (fort, *vicus*, *civitas* capital, small town, villa, rural site), form (bowl, storage jar, jar, beaker, dish, flagon, lid, *mortarium*, *amphora*, other), functional grouping (fineware, coarseware), and production date (early [first and second century], late [third and fourth century]). He then examined the numbers of texts attested for various pairings of values for these attributes with a view to elucidating patterns in literacy and pottery function. Although the limited sample size and the absence of information regarding the volume of the area excavated at each of the sites represented renders it difficult to draw firm conclusions regarding the significance of many of the relationships documented in this way, the results do illustrate quite clearly that the vast majority of texts (ca. 75%) at all site types consist of personal names, with the vast majority of these occurring on vessels belonging to the three groupings of classes categorized as "finewares," namely, the various gloss-slipped wares, color-coat wares, and parchment wares, with a particular predilection for examples belonging to the first of these groupings. Among the gloss-slipped wares there was a preference for plain as opposed to relief-decorated forms, suggesting, not surprisingly, that the owners of vessels were particularly inclined to provide them with some sort of identifying mark when they lacked distinctive decorative attributes that would have facilitated their recognition. Overall, the patterning documented by Evans confirms the assumption that gloss-slipped tablewares were regarded by their users as particularly valuable (Evans 1987: 202).

Several meta-analyses aimed at characterizing the relative proportions of gloss-slipped tablewares and other classes of pottery in the assemblages from groupings of sites in various regions of England have documented distinctive patterns in the distribution and consumption of the former, which are generally compatible with the idea that these classes were more highly valued by consumers than were other wares (Griffiths 1989; 1990; Evans 1993; Willis 1997). Although these classes presumably represented the high end of the pottery spectrum with respect both to cost and to perceived

preciousness, it is nonetheless important to keep in mind that they were almost certainly valued at only a small fraction of the price of comparable vessels in pewter and bronze, and the tiniest fraction of those in silver.¹³ On the basis of the archaeological data currently available it is difficult to arrive at any firm conclusions regarding how far up the socioeconomic scale the use of ceramic tablewares tended to reach and, conversely, how far down this scale the use of tableware vessels in bronze, pewter, and silver reached. The literary sources are of little help in evaluating this question, as it is clear that the contrast between the use of ceramic tablewares as opposed to plate came to represent a stock device, with the use of the former represented as emblematic of modesty and simplicity and that of the latter as a marker of luxuriousness and extravagance.¹⁴ One of the most striking results of the household inventory studies carried out at Pompeii in recent years (e.g., Berry 1997a, 1997b; Allison 2004), however, is the large number of bronze vessels attested in even fairly modest residences.

3

Manufacture and Distribution



This chapter considers two of the eight behavioral practices incorporated into the model of the life cycle of Roman pottery: manufacture and distribution. Because manufacture and distribution played only a limited role in governing the formation of the pottery record, the aim of this chapter is not to present a comprehensive discussion of these two practices, but rather the more limited goal of identifying and describing those aspects that are of interest in this regard.

3.1 / Manufacture

As defined in Chapter 1, manufacture is the fabrication of a vessel from one or more raw materials. There were several more or less distinct modes for the manufacture of pottery in the Roman world, ranging from individual potters working on a part-time basis within the context of rural households turning out small amounts of cookwares and utilitarian wares both for domestic consumption and for sale on the market, to small urban, suburban, and rural workshops staffed by a few full-time craftsmen manufacturing a wide array of products, generally including cookwares, utilitarian wares, and tablewares for local markets, to giant urban and suburban workshops staffed by up to a few score highly specialized workers engaged in the intensive manufacture of high-end gloss-slipped tablewares or lamps for a mass market (Peacock 1982). In some cases, small rural workshops operated within the context of a large agricultural estate, with a significant portion of their output destined for consumption within the estate, rather than for sale on the market (Aubert 1994: 205–6). In addition, many rural workshops and workshops located near important transport nodes, particularly ports, specialized primarily or exclusively in the manufacture of *amphorae* (Aubert 1994: 244–76). In some areas, both urban and rural clusters of household producers and/or small workshops grew up, forming nucleated pottery industries, with the rural variant not infrequently specializing in the manufacture of a narrow range of products, sometimes including lamps, utilitarian wares, cookwares, or

gloss-slipped tablewares that were distributed over large market areas. *Dolia*, it should be noted, were probably manufactured for the most part by specialist itinerant potters or by workshops that were also involved principally in the production of architectural ceramics.

The manufacturing process for Roman pottery generally involved at least six discreet stages: raw material procurement, paste preparation, forming, drying, firing, and postfiring handling and storage. The drying and firing stages of the manufacturing process were somewhat difficult to control, and a certain portion of the vessels formed in Roman pottery workshops were marred by production defects of one kind or another that occurred in the course of one or both of these two stages. Vessels that were dried too quickly might develop weak spots that would be transformed into cracks as the vessel contracted in the course of firing. Vessels that were insufficiently dried before being subjected to firing or vessels that were heated too rapidly in the initial water-smoking phase of the firing process might crack or explode. Vessels that were run up to the soaking temperature (the temperature at which the kiln was maintained for the bulk of the firing) too rapidly, or were exposed to an excessively high soaking temperature, might warp, bloat, or slump. Slipped vessels that were unevenly exposed to the firing gases inside the kiln or exposed to an overly oxygen-rich or oxygen-poor firing atmosphere might emerge from the firing discolored. Vessels that were allowed to cool too quickly at the end of the firing process might crack or have attachments such as handles pull away from the rest of the vessel. Vessels might also be damaged in the course of the firing process by the collapse of stacks of vessels that had been set next to them in the kiln, or by the collapse by some smaller or larger portion of the kiln structure itself. It should also be noted that vessels that emerged from the kiln in good condition might later be damaged in the course of postfiring handling and storage.

Many vessels with minor production defects were apparently marketed as is, perhaps in many cases as seconds, at a reduced price. Bulmer (Ward), for example, in evaluating the set of 160–166 Gallic *Sigillata* vessels recovered in the excavations carried out during the period 1974–8 in the civilian settlement at the site of Chester [Deva], in northwestern England, identified no fewer than twenty-six or twenty-seven vessels (16–17%) that she regarded as bearing one or more minor production defects (Bulmer 1980: 87). These included the warping of the rim or ring foot (four vessels), the presence of pronounced finger marks in the slip (ten vessels), and either sloppiness in throwing, the blurring of molded decoration, the presence of tool marks,

overfiring, or pronounced crazing of the slip (seventeen or eighteen vessels). This strikingly high incidence of defects should perhaps be attributed to the fact that during the period in which most of the vessels in question were made the workshops in which they were manufactured were likely maintaining markedly high rates of production.

Other vessels with production defects substantial enough to render them unmarketable, specifically those with relatively minor cracks, were subject to repair, either to correct the defect, or simply to mask it from potential buyers. Evidence for repairs of this kind is considered in Sections 8.1.3 and 8.2.3.

Some vessels, however, would have had more substantial production defects that rendered them unusable for their prime-use application while also placing them beyond any sort of cost-effective repair.¹ Potters presumably disposed of vessels of this kind, here termed *waster pottery*, by employing them for some reuse or recycling application around the workshop, by discarding them, either on the workshop premises or elsewhere, or by passing them on to others who intended to employ them for some reuse or recycling application off the workshop premises. A good illustrative example of this last practice comes from London [Londinium], where excavations undertaken at the Mansell Street cemetery site uncovered a cremation burial (CB 177) in which a Thameside Kent Ware jar dating to ca. A.D. 180–250 with what appears to be a major production defect in the form of a crack running from the vessel's rim down to just above the its base was employed as an ossuary (<http://www.museumoflondon.org.uk/ceramics/pages/object.asp?obj-id=477539>: Museum of London accession number MST87[228]<86>).

Although some waster pottery recovered from archaeological contexts can be readily recognized as such (e.g., vessels that show evidence of pronounced warping or collapse; sherds with a highly vitrified and/or bloated fabric, generally in association with pronounced reduction), much of this material (e.g., vessels that cracked during firing; vessels broken during post-firing handling and storage) is effectively indistinguishable from regularly manufactured pottery.² Despite this problem, the careful evaluation of pottery assemblages recovered in the excavation of Roman pottery workshops should provide some basis for determining the relative incidence of the various sorts of production defects mentioned above in certain chronological, geographical, technological, or organizational contexts within the Roman world, if not a basis for the calculation of overall loss rate, that is, the percentage of all vessels formed that wound up as waster pottery.³ To date,

however, Roman archaeologists have shown scant interest in undertaking studies of this kind, and virtually nothing useful can be said about these topics.⁴

Given the dearth of useful scholarship on this issue, the best that can be done at present is to venture a few highly generalized observations regarding the likely susceptibility of certain of the functional categories of Roman pottery to loss due to defects suffered in the course of the production process. First, the evidence suggests that *dolia*, immensely large, heavy, thick-walled vessels, were normally formed by means of the slab building or coiling technique.⁵ The combination of their exceedingly thick walls and the presence of seams between adjacent slabs or coils presumably meant that a significant number of these vessels developed cracks in the course of the drying and/or firing processes. This assumption is supported by evidence for repair of *dolia* discussed in Section 8.1.3. *Amphorae*, as sizable vessels that were manufactured in large numbers, were probably for the most part fired in relatively large kilns. It was in all likelihood significantly more difficult to obtain a uniform firing atmosphere inside a large kiln than it was inside a small one, and in an effort to ensure that all of the vessels in a load of *amphorae* set inside a large kiln were subjected to a minimally adequate firing regimen it may have been necessary to expose some portion of the load to excessive firing temperatures, resulting in a high proportion of wasters.⁶ This assumption is supported by several classes of *amphorae* manufactured in Tunisia, which often show evidence of exposure to firing temperatures high enough to have resulted in the advanced vitrification of the ceramic body. Finally, it seems likely that many classes of slipped tablewares, especially high-end gloss-slipped tablewares, were prone to irregularities in the color and evenness of their surface coating that rendered them unmarketable due to difficulties experienced in controlling the temperature and atmosphere inside the kilns in which they were fired.

The discard of waster pottery is discussed in Section 10.3.

3.2 / Distribution

As defined in Chapter 1, distribution involves the physical transfer of a newly manufactured vessel from those who manufactured it to those who will use it. A significant portion of Roman pottery was probably consumed by the economic units that produced it, specifically *amphorae* manufactured in workshops operated either by the agricultural estates that also produced the wine, oil, or fruit packaged inside them or by the *cetariae* (establishments

for the confection of fish products) that produced the fish products packaged inside them. In some cases, potters also no doubt sold or bartered the vessels that they produced directly to consumers, either at the workshop, itself, or at a retail outlet located somewhere in its immediate vicinity. It is clear from the distributional evidence, however, that a very substantial portion of Roman pottery must have reached the persons who used it via complex exchange mechanisms of some kind that involved more or less specialized retailers and middleman wholesalers, who regularly transported it short, medium, or long distances by road, river, and/or sea (Peña 1999: 30–36). The textual evidence from the Roman world provides little information regarding the specific mechanisms involved in the distribution of pottery, and efforts to reconstruct these depend largely upon distributional evidence and finds of pottery that was lost or discarded at some point between the workshop where it was manufactured and the consumer.⁷ The bulk of the latter consists of consignments of pottery that were being carried aboard merchant ships as cargo when the ships went down. In some cases, however, groups of pottery apparently lost or discarded in the course of distribution have been recovered inside structures that appear to have functioned as retail shops, or in locales situated at or near a market, a storehouse, or a harbor. Outside the northern provinces of the empire, where there is epigraphical evidence for merchants termed *negotiatores cretarii* during the later second and the third centuries (Aubert 1994: 213–14), there is no evidence for specialized pottery wholesalers in the Roman world, and it seems likely that the long-distance distribution of pottery was undertaken for the most part by wholesale merchants who dealt in several different kinds of goods. Although it is clear that at least some retail sale occurred in shops that dealt in pottery and related goods, such as glassware and hardware, some Roman pottery may have reached consumers via itinerant sellers.

Given the complexity of the distribution systems likely involved in the marketing of some Roman pottery, it seems probable that in some cases it may have required as long as several years for newly manufactured vessels to reach retail outlets and then consumers. Interesting in this regard is the evidence from Cala Culip 4, the wreck of a small merchantman that sank off the northeast coast of Spain during the 60s or 70s (Nieto Prieto, Jover Armengol, Izquierdo Tugas, Puig Griessenberger, Alaminos Exposito, Martin Menendez, Pujol Hamelink, Palou Miquel, and Colomer Marti 1989; Parker 1992a: 157 no. 347). Among the ship's nonperishable cargo were 4,118 pottery vessels, including 1,475 examples of Baetican Thin-Walled

Ware, 2,601 examples of South Gallic *Sigillata*, and 42 lamps, and it appears as though those sailing aboard the vessel at the time of its sinking were engaged in the distribution of these classes of tableware pottery and lamps along the stretch of the Mediterranean coast between Narbonne [Narbo] and Ampurias [Emporiae] in a sort of cabotage trade. The patterning in the distribution of maker's stamps exhibited by the South Gallic *Sigillata* is of considerable interest, for although twenty-three of the forty-six makers represented were attested by but a single stamp, four were attested by more than 100 stamps, with one of these represented no fewer than 1001 times. This suggests that the ship took on sizable consignments of vessels produced by individual workshops, selling these off in small lots as it made port in various locations, with the odd leftover remaining aboard for what was presumably some substantially longer period of time (Millet 1993: 418–19).

Ceramic vessels are for the most part fairly fragile items, and there can be no doubt that a certain portion of the pottery marketed by means of middlemen and retailers was broken or otherwise damaged in the course of distribution. It may have been possible to carry out cosmetic repairs to some vessels that had been chipped or scratched, or even in some cases broken, and to pass these along to undiscerning or unwary buyers or to sell them as seconds. Many such vessels, however, would have been beyond repair, and the wholesalers or retailers who found themselves in possession of these must have been obliged to dispose of them either by passing them along to others who intended to employ them for some reuse or recycling application, or by discarding them, often on the premises of a shop or warehouse or somewhere nearby, along a roadside, into a river or the sea, or alongside or into a harbor.

In some cases vessels recovered from archaeological contexts can be recognized as pottery that was discarded in the course of distribution. Generally speaking, vessels of this kind are conspicuously free of any evidence of use, including, in the case of slipped vessels, scratching, chipping, and/or abrasion of the slip on the interior and the underside of the base, and, in the case of cookwares, the presence of sooting. Many vessels recovered from consumption sites, which were presumably subject to normal use, do not display conspicuous evidence of this kind, however, and it is only when a sizable number of vessels that display no evidence of use are recovered together that one can feel confident that the vessels in question were discarded in the course of distribution. In many instances, groups of vessels of this kind, as the products of a single workshop or a small group of workshops that were

manufactured over a brief span of time, also display a pronounced degree of homogeneity in forms, dimensions, decoration, maker's stamps, and/or production techniques.

There is no basis for estimating the portion of Roman pottery that was lost due to damage suffered in the course of distribution. All that can be said is that the loss rate was presumably greater for particularly fragile wares, such as the various thin-walled wares, forms that had exposed elements and/or could not be nested for transport, such as closed vessels with projecting handles, and vessels that were moved over relatively long distances, particularly overland, or the distribution of which involved several stages that entailed repeated loading and unloading from various means of transport.

The discard of pottery damaged during the course of distribution is discussed in Section 10.4.

4

Prime Use



This chapter considers the behavioral practice of prime use. As was the case with the treatment of manufacture and distribution in Chapter 3, the aim of this chapter is not to present a comprehensive discussion of this behavioral practice, which by itself represents a subject worthy of book-length treatment, but rather the more limited goal of identifying and describing those aspects that played a direct role in governing the formation of the Roman pottery record. Two such aspects are here addressed: the loci of prime use, and vessel use-life.

4.1 / *The Loci of Prime Use*

As defined in Chapter 1, prime use entails the use of a vessel for the purpose for which it was manufactured. Although there is no evidence that permits one to develop useful estimates for the portion of Roman pottery that was disposed of by means of recycling or discard in the context of manufacture, distribution, prime use, and reuse, it seems inherently likely that the portion disposed of in the context of prime use was substantially greater than the portion disposed of in the context of any of the other three.

Although Roman pottery would have been employed for its prime-use application in a variety of different behavioral loci, for purposes of discussion it is possible to reduce these to three general categories of loci, indicating for each a set of functional categories of pottery that were likely to have been employed there in significant quantities on a routine basis:

1. Agricultural compounds (*dolia, amphorae*).
2. Facilities for the wholesale/storage or bulk retail of foodstuffs (*dolia, amphorae*).
3. Residences and similar loci (*amphorae*, lamps, cookwares, utilitarian wares, tablewares).

Other loci that can be subsumed under the last of these three general categories include various places where food was regularly stored in small or moderate quantities, prepared, and consumed, including bars and restaurants, workshops and other work sites, sanctuaries, meeting facilities for *corpora* and *collegia* (occupational and religious organizations), military posts, and ships and boats.

It appears unlikely that the activities normally carried out at agricultural compounds would have generated large amounts of pottery that had completed its prime-use application and required disposal.¹ In contrast, the activities carried out at many facilities for the wholesale/storage or bulk retail of foodstuffs would have generated substantial numbers of *amphorae* that had been emptied of their contents and required disposal on a routine basis. Residences and similar loci would have generated small to moderate amounts of *amphorae*, lamps, cookwares, utilitarian wares, and tablewares that had completed their prime-use application, often probably on a somewhat irregular basis. Vessels that had completed their prime-use application at any of these categories of loci might have been disposed of by being employed on the premises for some reuse or recycling application, passed on to others who intended to employ them elsewhere for some such application, or discarded, either on the premises or elsewhere.

The discard of refuse pottery generated by facilities for the wholesale/storage or bulk retail of foodstuffs and by residences and similar loci is discussed in Sections 10.5 and 10.6, respectively.

4.2 / Vessel Use-Life

Although the formulation of the life cycle of Roman pottery presented in Chapter 1 divides use-life into prime-use use-life and reuse use-life, it remains difficult to disentangle the two in practice. Because the bulk of the evidence regarding the use-life of Roman pottery appears to relate to its prime-use use-life, however, it seems appropriate to consider this topic in the context of a consideration of this behavioral practice. After a consideration of various general aspects of vessel use-life, the remainder of this section examines the evidence for the use-life of vessels belonging to each of the six functional categories of Roman pottery, focusing on the circumstances that led to vessels belonging to each of these categories being retired from use and the length of these vessels' use-life.

4.2.1 / *General Aspects of Vessel Use-Life*

It stands to reason that vessels manufactured using similar raw materials and production techniques and employed for similar applications tend to remain in use for similar periods of time before either wearing out or breaking.² In theory, the use-lives associated with vessels belonging to specific forms and/or functional categories of archaeological pottery can be reconstructed by comparing the representation of vessels belonging to these categories in life assemblages, that is, sets of vessels recovered in use-related contexts, with those attested in death assemblages, that is, sets of vessels recovered from discard contexts (Shott 1989: 14). As noted in Section 2.1.3, however, the recovery of life assemblages is a rare occurrence in archaeology. Further, the study of death assemblages toward this end is rendered problematic by difficulties involved first in defining, and then in recognizing residual materials (Going 1992). As a result, there is, to the author's knowledge, no instance in which an analysis of this kind has made a significant contribution to the understanding of vessel use-life.

In light of the difficulties involved in evaluating vessel use-life on the basis of archaeological evidence, some researchers have sought to shed light on various aspects of the topic by conducting ethnographic and/or ethnoarchaeological studies among contemporary groups, observing the factors that affect vessel use-life, and documenting the length of time that vessels belonging to different forms and functional categories of pottery tend to remain in use (Kramer 1985: 89–92; Rice 1987: 293–9; Mills 1989: 135–41; Orton, Tyers, and Vince 1993: 207–9; Shott 1996: 467–8; David and Kramer 2001: 99–102). This research has highlighted several factors that tend to precipitate the retirement of pottery from prime use and elucidated some of the ways in which vessel use-life varies in accordance with vessel function. It should be noted, however, that much of this work has focused on groups in which pottery is produced within the household by nonspecialists employing relatively simple manufacturing techniques, including hand-forming and low-temperature firing in either bonfires or pits. Most Roman pottery, in contrast, was produced by specialized craftsmen, who employed the potter's wheel and kilns that likely reached soaking temperatures in the range of 800–1,000°C, and who distributed their wares to consumers via the market. As a consequence, it seems likely, on the one hand, that the relationship between pots and their users is significantly different among these groups from what it was in the Roman world, with the result that certain of the

factors that govern the retirement of pottery from prime use are apt to have figured differently in the Roman case, and, on the other, that Roman pottery was generally more resistant to many forms of breakage and/or surface attrition than the vessels considered in these studies. The results of these studies are thus likely to be only loosely applicable to the Roman case, and may, indeed, prove misleading to some extent.

Given the problems just noted, it is possible to venture only very general and, in many cases, somewhat speculative comments regarding the probable use-lives of the six functional categories of Roman pottery, basing these on logical considerations of the several factors likely to have affected vessel use-life and a limited amount of direct evidence.

Turning first to logical considerations, these suggest that in the Roman world vessels were usually retired from use for one of four reasons: they had fulfilled some specific, limited-term purpose, they had worn out, they had broken, or they had come to be regarded as obsolete. It should be noted that in some instances maintenance operations could have been employed to ameliorate the second and third of these four circumstances, allowing a vessel to be retained in use.

With regard to the first of these four possibilities, the fulfilling of some limited-term purpose, the example that comes most immediately to mind is that of an *amphora* acquired as packaging for some foodstuff that has been rendered superfluous by the consumption of its content. Not to be overlooked, however, is the possibility that in some instances vessels employed in certain outlying locations were abandoned upon completion of the activity for which they had been brought there, the individuals involved deeming it not worth the effort to transport them to some other location for further use.

The second of the four, wearing out, may have involved the loss of a coating on a vessel's interior surface; the absorption into a vessel's wall of residues (e.g., food residues, soot) or the buildup on its surface of incrustations (e.g., carbonized food, calcium carbonate); or the attrition of a vessel's surface (or in extreme cases, the wearing through of its wall) through repeated chafing, grinding, pounding, cutting, or chopping.

The third of the four, breakage, may have occurred as the result of normal usage. The clearest example of this would be the case of a cooking vessel that breaks due either to thermal shock caused by its exposure to a sudden temperature increase or decrease or to thermal stress that has built up due to its repeated exposure to cycles of heating and cooling. Similarly, a handle may

separate from a vessel as the result of strain that builds up in the attachment area through repeated use. In other cases, the normal use of a vessel may require its deliberate breakage. In the Roman case, for example, literary sources indicate that certain cooking and storage vessels were broken in order to facilitate the extraction of their content,³ whereas the archaeological record indicates that in some instances vessels employed in certain rituals, such as funerary banquets, were deliberately broken, presumably as part of the ritual (Pellegrino 2001: 371). Breakage may also occur as an accident, of course, with a vessel inadvertently struck, stepped on, knocked over, dropped, dislodged from an elevated storage location, smashed by a falling object, bumped against another vessel, etc. Ethnographic studies indicate that in many societies a substantial portion of accidental breakage is caused by children and domestic animals, and there is some anecdotal evidence in the literary sources that this was to some extent true in the Roman case.⁴

Finally, the retirement of vessels from use due to the fact that they had come to be regarded as obsolete may have occurred for reasons of either performance or appearance. The former is not likely to have been of much significance in the Roman case, as there is little evidence for the widespread dissemination of new ceramic technologies in timeframes short enough to have rendered a still serviceable vessel significantly inferior to a newly manufactured one with regard to performance. It does seem possible, however, that in some instances the sudden introduction into a particular market of a hitherto unavailable ware offering (or believed to offer) performance characteristics superior to those of the traditionally available wares led to the occasional or even widespread retirement of the latter from prime use. More likely, however, the frequent, if not always regular, introduction of new forms, decorative techniques, and/or decorative patterns would have rendered still serviceable vessels obsolete from the point of view of taste, leading to their replacement with products embodying the newer style. This phenomenon is likely to have been of particular significance with vessels employed in contexts regarded as appropriate venues for social display, such as those that functioned for the serving and consumption of food and drink, either high-end pieces, because these were apt to attract greater attention, or those at the lower end of the scale, as these could have been replaced with only modest outlays.

One need also consider in this connection the factors that would have motivated persons to retain in use rather than to retire pottery that was worn, broken, or either technically or esthetically outmoded. First and foremost,

of course, would have been replacement cost. Although, as discussed in Section 2.3, pottery was an inexpensive good, people at the lower end of the economic scale presumably had little money for discretionary purchases of any sort, and one can assume that they would have been inclined to retain vessels in use for as long as practicable. As might be expected, there are passages in the literary sources that provide anecdotal evidence for just this kind of behavior. Thus Martial (*Epigrammata* 11.56), in mocking a Stoic for the fact that he draws his virtue from the squalor of his existence, lists among the man's possessions a *fracta . . . urceus ansa* [jug with a broken handle]. Again, in a mocking depiction of a destitute man being evicted from his lodgings, Martial (*Epigrammata* 12.32) lists among his decidedly shabby belongings a *matella curto rupta latere* [a chamber pot with a break in its low wall] and a *cervix amphorae* [amphora neck]. A second factor would have been the degree of ease with which a vessel could have been replaced. Romans presumably would have been inclined to retain in use for longer periods of time examples of forms or wares not regularly available on the local market due to the discontinuation of either production or distribution.⁵ Last, some individuals no doubt developed personal attachments to particular vessels, either on account of some specific association (e.g., a vessel was a gift from a treasured friend or had been owned by a deceased loved one) or because they simply liked their appearance. There is, of course, no way to take account of this factor, except perhaps to assume that attachments of this sort were more apt to have grown up in connection with vessels that were in some regard unusual.

Of particular interest with regard to the continued use of broken vessels and vessel parts is *Mishnah* Tohoroth Kelim 2.2.⁶ This passage considers the circumstances in which broken vessels and parts thereof can be regarded as clean according to Jewish law. This was a question of interest to Jews, because a pot, which was considered susceptible to uncleanness by virtue of its status as a vessel, ceased to be so once it had been cracked, holed, or broken in such a way as to render it no longer classifiable as a vessel. The text of this passage is as follows:

הדקין שבכלי חרס וקרקרותיהן ודפנותיהן יושבים שלא מסומכין שיעורן מכדי סיכת קטן ועד לוג מלוגעד סאה ברביעית מסאה ועד סאתים בחצי לוג מסאתים ועד שלש ועד חמש סאין כלוג דברי רבי ישמעאל רבי עקיבא אומר אני איני נותן כהן מדה אלא הדקין שבכלי חרס וקרקרותיהן ודפנותיהן יושבין שלא מסומכין שיעורן מכדי סיכה קטן ועד קדרוח הדקוח מהקדרות הדקות ועד חביות לודיות בדביעית מלודיות ועד לחמויות כחצי לוג מלחמויות ועד חצבים גדולים בלוג רבי יוחנן בן זכאי אומר חצבים גדולים שיעורן בשי לוגין הפכים הגלילים והחביונות שיעור קרקרותיהן כלשהן ואין להם דפנות

[The smallest remnants of earthenware vessels and the bottoms and sides (of broken vessels) that can stand without support (remain susceptible to uncleanness) if, (having when unbroken held) as much as a *log* [0.505 l], they can still hold enough (oil) to anoint the little finger (of a child), or if, (having when unbroken held) from one *log* to one *seah* [24 *logs*, or 12.12 l], they can still hold a quarter-*log* [0.14 l], or if, (having when unbroken held) from one to two *seahs* [24.24 l], they can still hold a half-*log* [0.25 l], or if, (having when unbroken held) from two or three or up to five *seahs* [60.6 l], they can still hold one *log*. So Rabbi Ishmael. But Rabbi Akiba says: I would not prescribe any measure for (the unbroken) vessels; (but, rather, the rule should be:) The smallest remnants of earthenware vessels and the bottoms and sides (of broken vessels) that can stand without support (are still susceptible to uncleanness) if after having been as large as small cooking-pots, they can still hold (oil) enough to anoint the little finger (of a child); or if after having been as large as Lydda jars, they can still hold a quarter-*log*; or if after having been of a size between Lydda jars and Bethlehem jars, they can still hold a half-*log*; or if after having been a size between Bethlehem jars and large store-jars, they can still hold one *log*. Rabbi Johanan ben Zakkai says: The capacity of the fragments from large store-jars is two *logs* [1.01 l]; the capacity of the bottoms of (broken) Galilean cruses and of little jars may be aught soever; but their broken sides are not susceptible to uncleanness.]

(adapted from Danby 1933: 606)

The fact that at least three different rabbis felt the need to provide guidelines regarding the minimum size of vessel bottoms, sides, and other fragments that remained susceptible to uncleanness and the fact that their views were reported in the *Mishnah* suggests that the reuse of broken vessels and vessel parts in connection with the storage, preparation, serving, and/or consumption of food was a common practice in Jewish communities both at the time of this work's composition during the second half of the second century and during the period preceding this. The opinions of Rabbi Akibah and Rabbi Johanan ben Zakkai consider vessels representing five specific forms belonging to three or four different functional categories, including one cookware form, קדרות הדקות [*kederot hadakot*; small cooking-pots] (Zevulun and Olenik 1979: 32–3), two jars of different sizes manufactured in specific regions that probably correspond to distinct variants of the Palestinian bag-shaped *amphora*/Late Roman 5–6 *amphora*, חביית לודיית [*chabiyot lidiyyot*; Lydda jars] and לחמיית (חביית) [*chabiyot lechemiyot*; Bethlehem jars]

(Zevulun and Olenik 1979: 26), a large storage jar that may correspond to a *dolium*, הצבים גדולים [*chatsabim gedolim*; large storage jars], and two closed forms that probably represent tableware or utilitarian ware vessels, הפכים הגלילים [*ha pakhim ha gelilim*; Galilean cruses],⁷ and חבינות [*chabiyonot*; little jars]. The implication that a wide range of broken vessels and parts thereof were employed in this way is reenforced by the opinion of Rabbi Ishmael, which considers vessels with capacities that range from a low of ca. 0.5 l to as much as ca. 60 l.

4.2.2 / *The Use-Life of Dolia*

Most *dolia* were probably used in or around either an agricultural compound or a *horrea* [storehouse]. Two or three rows of *dolia* were also sometimes positioned along the keel of a merchant ship, apparently cemented in place to prevent their shifting, functioning as fixed receptacles for the transport of wine (Tchernia 1986: 138–40; Aubert 1994: 260–61). As has been seen, the pricing evidence indicates that their acquisition represented a very substantial investment of funds, and, given their great weight and bulk, their replacement must have represented a very substantial inconvenience.⁸ A passage in the *Geoponica* (6.3) more or less corroborates this inference, stating that due to the substantial inconvenience involved in manufacturing *píthoi* some people employ old containers, even though this may cause harm to the wine that they wish to store. One can thus assume that great care was exercised to avoid breaking *dolia* and that they were scrupulously maintained to ensure a long use-life. Passages in the Latin agronomists, discussed in Section 8.1, support the latter assumption.

How prone *dolia* were to breakage, given the way in which they were used, remains unclear. It seems likely that many examples remained in the same location inside an enclosed and/or covered storage facility for years at a time, if not, indeed, for decades, and in many cases they were partially interred (so-called *dolia defossa*), adding an extra measure of protection against breakage. At the same time, although these vessels had extremely thick walls, the fact that they were manufactured by either the slab building or coiling technique meant that they were prone to fracture along the junctures between adjacent slabs or coils. According to Columella (*De re rustica* 18.12.7), there was a risk that *dolia* might break when being heated for coating with pitch, whereas Varro (*De re rustica* 1.13.6) states that *dolia* employed for the fermentation of must were sometimes burst by the pressure that built up inside them. The fact that in many instances *dolia* had wine or olive oil transvased into and out

of them on a regular basis from/to *amphorae* and/or casks – large, heavy, and somewhat unwieldy containers – may have meant that they were particularly prone to breakage in the rim/shoulder area. Evidence from the Caseggiato dei Doli, a storehouse in Ostia, discussed in Section 8.1.3, shows, in fact, that in at least some circumstances *dolia defossa* were commonly subject to breakage in precisely these areas.

In many cases *dolia* may have been retired from prime use only when, after a very lengthy period of employment, they had begun to impart a bad taste to their content due to the absorption into their walls of residues, or either were abandoned along with the storage facility in which they were housed or went down with the ship in which they were mounted. It should be noted, however, that in some instances excavations have recovered features that appear to be robbing pits produced by the salvaging of *dolia* from abandoned structures (Paroli 1996: 253–5; Slane 2004: 361), indicating that the vessels in question were considered still useful either by those abandoning the structure or by other individuals who salvaged them at some later point.

Although there is no direct evidence regarding the use-life of *dolia* in absolute terms, it seems likely that a significant number of these containers remained in prime use for extremely long periods of time. Ethnographic research indicates that in some cases large storage vessels remain in use for several decades (Rice 1987: 297), and it thus seems plausible to suggest that *dolia* regularly remained in prime use for up to 20–30 years, and perhaps even longer.

4.2.3 / *Amphorae*

In contrast with *dolia*, there is considerable direct evidence regarding the use-life of Roman *amphorae*. Interestingly, the Roman jurists, when considering legal issues connected with legacy, uniformly regarded wine *amphorae* as incidental packaging rather than as containers intended for ongoing use. Proculus, a jurist active during the first half of the first century, furnishes a clear articulation of this view, contrasting the status of *amphorae* with that of *dolia* (*Digesta* 33.6.15):

Proculus libro secundo epistularum *Vinum cum vasis legavit. Negat Trebatius quod in doliis sit deberi et sensum testoris alium putat esse, verborum alium: ceterum dolia in vasis vinariis non essent. Ego et si dolia in vasis vinariis non sunt, tamen non concederem Trebatio vinum quod in doliis esset, id est quod in vasis non esset, non*

esse legatum. Illud verum esse puto, cui vinum cum vasis legatum erit, ei amphoras cados, in quibus vina diffusa servamus, legatos esse: vinum enim in amphoras et cados hac mente diffundimus, ut in his sit, donec usu causa probetur, et scilicet id vendimus cum his amphoris et cadis: in dolia autem alia mente coicimus, scilicet ut ex his postea vel in amphoras et cados diffundamus vel sine ipsis doliis veneat.

[Proculus *Letters book two*: A man has legated “wine along with its containers.” Trebatius denies that any wine that is being stored in *dolia* is owed, and thinks that the intent of the testator is one thing, the intent of his words something different, and, further, that *dolia* do not qualify as “wine containers.” Even if *dolia* do not qualify as wine containers, I would not concede to Trebatius that the wine that is being stored in *dolia*, that is, that which is not in wine containers, has not been legated. I believe it to be true that when “wine along with its containers” has been legated to someone, *amphorae* and *cadi*, containers in which we store wine that has been poured off, have been legated to him. For we pour off wine into *amphorae* and *cadi* with this intention – that it remain in these straight through to the point when it is tested in connection with its enjoyment, and we sell it, of course, along with these *amphorae* and *cadi*. However, we put it into *dolia* with a different intention, namely, of course, that we will later pour it off into *amphorae* and *cadi*, or that it may be sold without the *dolia*, themselves.]

For Proculus, the crucial difference between *dolia* and *amphorae* lay in the fact that, whereas the former served for the temporary storage of wine prior to its sale, the latter served for its distribution and more long-term storage, and were sold along with the wine that they contained.⁹

Also worth citing in this connection is the view of Ulpian, a jurist active during the early third century (*Digesta* 33.6.3):

Ulpianus libro vicesimo tertio ad Sabinum *Si vinum legatum sit, videamus, an cum vasis debeatur. Et Celsus inquit vino legato, etiamsi non sit legatum cum vasis, vasa quoque legata videri, non quia pars sunt vini vasa, quemadmodum emblemata argenti (scyphorum forte vel speculi), sed quia credibile est mentem testantis eam esse, ut voluerit accessioni esse vino amphoras: et sic, inquit, loquimur habere nos amphoras mille, ad mensuram vini referentes. In doliis non puto verum, ut vino legato et dolia debeantur, maxime si depressa in cella vinaria fuerint aut ea sunt, quae per magnitudinem difficile moventur. In cuppis autem sive cuppulis puto*

admittendum et ea deberi, nisi pari modo immobiles in agro velut instrumentum agri erant. Vīno legato utres non debebuntur: nec culleos quidem deberi dico.

[Ulpian, *Sabinus* book 23: If wine has been legated, let us consider whether it is owed along with its containers. Celsus states that when wine has been legated its containers would also appear to have been legated, even if it has not been specified that it has been legated with containers, not because containers constitute an integral part of wine, as would be the case with silver appliqué on cups or on a mirror, but because it is plausible that the testator wished that *amphorae* be included along with the wine as an accessory. In this way, he states, when we say that we have one thousand *amphorae*, we are referring to the amount of wine (i.e., rather than to containers). In cases in which wine is stored in *dolia*, I do not believe it true that when wine has been legated the *dolia* are also owed, especially if they have been sunken into the floor of a wine storehouse or they are of the sort that it would be difficult to move on account of their size. However, in cases in which wine is stored in *cuppae* [large casks] or *cuppulae* [small casks], I believe that it should be admitted that these are owed, unless in a similar fashion they have been so fixed in a field as to constitute part of that field's equipment. When wine has been legated, *utres* [small wineskins] are not owed, nor, indeed, I assert, are *cullei* [large wineskins].

For Ulpian, wine *amphorae* were an accessory to their content, as were also wooden wine casks. *Dolia* and skin containers, in contrast, were not in his view to be similarly regarded as accessories. The reason that *dolia* were excluded from this category is clear enough: they were fixed facilities that were not normally employed for the distribution of wine. The reason that skin containers were excluded is somewhat less clear. In all likelihood, however, this lay either in the fact that skin containers were employed largely for the bulking of wine for its wholesale distribution, and not for its subsequent transport, retail distribution, and postdistribution storage, or in the fact that they were significantly more expensive than *amphorae* and casks (Peña 1999: 36–7).

Although both of these passages are concerned with the case of wine *amphorae*, olive oil, fish products, and fruit *amphorae* were also presumably regarded in a similar way.

There was no doubt a great deal of variation in the length of time that filled *amphorae* were held in storage before being opened and emptied of their content. Many wines spoil within a matter of months, and a significant

portion of wine *amphorae* were presumably opened and emptied immediately upon reaching their destination, with their contents transvased into storage containers such as *dolia* or casks, or poured off into smaller vessels for wholesale or retail sale or for consumption. As the literary sources make clear, however, many vintages could be kept for periods of several years without spoiling. Galen (*De antidotis* 14.15), for example, writing in the second half of the second century, noted that *Surrentinum* (i.e., wine from the area of Sorrento [Surrentum], on the southern shore of the Bay of Naples) less than 20 years old was not yet mature. In a similar vein, Pliny the Elder (*Naturalis historia* 14.6.57), writing in the middle decades of the first century, stated that no item appreciated in value so much as did wine up through its twentieth year. He also noted (*Naturalis historia* 14.6.55), apparently as an extreme case, the availability in his day of wine nearly 200 years old. Wine left to age for a period of several years was presumably held in the *amphorae* in which it originally had been bottled. Thus, Galen (*De antidotis* 14.25–6) indicates that in selecting the *Falernum* (i.e., wine from the *ager Falernus* district of northern Campania) that he employed in the preparation of medicines for the emperor Marcus Aurelius, he would proceed by examining the consular dates included in the *tituli picti* on the kerámia, sampling first those vessels containing wine that was more than twenty years old, and then working his way forward through progressively younger vintages until he found one that was free of a bitter taste. Again, Martial (*Epigrammata* 8.15), writing in the second half of the first century, refers poetically to a wine *amphora* that was *centeno consule facta minor* (shrunken through 100 consulships). Finally, Pliny the Elder, in the passage just noted concerning wine that was nearly 200 years old, stated that this fetched a price of 100 *nummi* per *amphora*, perhaps referring in this instance to a ceramic container rather than to a measure of volume. It thus seems likely that significant numbers of wine *amphorae* were kept in storage for as long as two decades before being opened and emptied, with at least a few examples held unopened for considerably longer periods of time, in some very rare cases perhaps even as much as 200 years.

In sharp contrast with wine, olive oil normally has a shelf life on the order of no more than three years (Martin-Kilcher 1987: 177). Filled oil *amphorae* thus normally would have been retained in storage unopened for a period no longer than this. There is no evidence regarding the shelf life of fish products, and the maximum amount of time that *amphorae* containing these are liable to have been held unopened thus remains unclear. Fruit packaged in *amphorae* was presumably consumed within a fairly brief period of time, perhaps no more than a year.

TABLE 4.1. Complete *Amphorae* with Dated *tituli picti* from Pompeii

Date of Titulus Pictus	Age in Years in A.D. 79	Reference in CIL 4	Form (Schöne)
A.D. 25	53–54	2552	?
A.D. 43 or 47	31–32 or 35–36	5511	12
A.D. 47	31–32	2553	12
A.D. 56	22–23	5514	12
A.D. 58	20–21	2554	12
A.D. 59	19–20	10,261	8
A.D. 60	18–19	5518	12
A.D. 62	16–17	9315	12
A.D. 63	15–16	5519	12
A.D. 55, 57, 58, 60, or 68	10–24	5516	?
A.D. 55, 57, 58, 60, or 68	10–24	5517	11
A.D. 68	10–11	9316	?
A.D. 70	8–9	5522	12
A.D. 71	7–8	5523	12
A.D. 72	6–7	2556	12
A.D. 72	6–7	5524A	12
A.D. 72	6–7	5524B	12
A.D. 72	6–7	9317A	12
A.D. 72	6–7	9317B	12
A.D. 72	6–7	9317C	12
A.D. 75	3–4	2557	12
A.D. 75	3–4	2558	12
A.D. 75	3–4	2559	12
A.D. 78	0–1	5529	8

Although it seems likely that a substantial portion of *amphorae* that had been emptied of their content were either subject to immediate discard or broken down into sherds for recycling, these containers lent themselves to a wide array of reuse applications, and, as discussed in Chapters 5 and 6, significant numbers were reused in either unmodified or modified condition, remaining in the systemic context.

Because *amphorae* were sometimes provided with *tituli picti* recording the consular date, presumably for the purpose of indicating the year in which they were filled, it is possible to employ archaeological evidence to evaluate the picture of *amphora* use-life provided by the literary sources.¹⁰ Most informative in this regard is the evidence from Pompeii. The excavations carried out in the town and at the villas in its environs have produced at least twenty-four intact *amphorae* bearing dated *tituli picti* that appear likely to have been in use for some purpose or other at the time of the eruption of Vesuvius in A.D. 79. The data relating to these are summarized in Table 4.1.¹¹ The problem of translating form identifications recorded in the Schöne–Mau classificatory scheme employed for the publication in

CIL of *tituli picti* from Pompeii is discussed in Section 5.3. For the purpose at hand it will be sufficient to note that the three categories represented, Schöne Form 8, 11, and 12, are all likely to have been employed as wine containers. The data break down neatly into groups, with one-half of the containers from 0 to 10 years old, three-eighths between 10 and 25 years old, and the remaining one-eighth more than 25 years old, with the oldest container 53–4 years old. Although it is unclear to what extent these data are representative of the larger universe of *amphorae* in use in and around Pompeii in A.D. 79, they may be regarded as at least a rough indicator of the distribution of ages of the wine *amphorae* then in the systemic context.

Two instances of what was defined in Chapter 1 as depositional reuse present data relevant to the question of *amphora* use-life and are also here worth considering. The first of these is the structured landfill built inside the ditch of the Servian *agger* (bank and ditch defensive feature) in the Castro Pretorio district of Rome (Dressel 1879; Commissione per la Carta Archeologica d'Italia 1977 no. 13–14 a).¹² The several hundred more or less intact *amphorae* recovered from this feature included twenty-two containers that bore dated *tituli picti* (Dressel 1879: 40–53). The data pertaining to these are summarized in Table 4.2. All of the *amphorae* for which a class has been indicated, save one, are wine containers, either Dressel 1s, Dressel 2–4s, or Dressel 6s. The exception is a container said to be similar in form to the Dressel 9, a fish products container from southern Spain, which in this specific instance appears from the two *tituli picti* that it bears to have been reused for the packaging of wine. Although Zevi has argued that this feature probably dates to the period ca. A.D. 50–60 (Zevi 1966: 211–2), the distribution of consular dates on these containers suggests that it may have been constructed within no more than a few years of the latest securely dated of these *tituli picti*, hence in the later A.D. 30s, and the *amphora* age data presented in Table 4.2 have been calculated on the basis of this assumption.¹³ Although the range of dates attested in this group is broadly similar to that attested at Pompeii, their distribution is substantially different. In this case, ca. one-quarter of the *amphorae* are from 0 to 10 years older than the latest securely dated *amphora* in the group, another ca. one-fifth are from 10 to 25 years older than this container, and ca. three-fifths are older than this, with the oldest container 68–9 years older than the latest securely dated *amphora* in the group.¹⁴

The second of the two instances of depositional reuse that provide evidence regarding *amphora* use-life is the so-called First Amphora Wall at

TABLE 4.2. *Amphorae* with Dated *tituli picti* from the Castro Pretorio Landfill at Rome

Date of Titulus Pictus	Age in Years in A.D. 36	Reference in CIL 15	Class (Dressel)
34 B.C.	68–69	4606	1
28 or 27 B.C.	61–63	4618	3 <i>similis</i>
25 B.C.	59–60	4567A	1
25 B.C.	59–60	4567B	1
25 B.C.	59–60	4607A	1
25 B.C.	59–60	4607B	1
23 B.C.	57–58	4566	1
20 B.C.	54–55	4559	1
19 B.C.	53–54	4590	1
13 B.C.	47–48	4575	1
8 B.C.	42–43	4609	4
A.D. 3	32–33	4571	2 or 3
A.D. 13	22–23	4565	2
A.D. 16	19–20	4610	?
A.D. 22	13–14	4611	?
A.D. 24	11–12	4568	4
A.D. 29	6–7	4603	2
A.D. 31	4–5	4570	9 <i>similis</i>
A.D. 31 or 45	4–5	4612	?
A.D. 32	3–4	4576	3
A.D. 36	< 1	4573	2
A.D. 36	< 1	4582	6

Carthage (DeLattre 1894; Freed and Moore 1996). This feature, a retaining wall constructed of ca. 6,000 more or less intact *amphorae* probably in or shortly after 15 B.C., yielded thirteen containers bearing dated *tituli picti* (DeLattre 1894: 94–8).¹⁵ The data pertaining to these are summarized in Table 4.3. Although not all of these containers have been identified as to their class, Freed and Moore report that they include two Dressel 1s, one Dressel 6A, one Dressel 2–4, and one Dressel 4, all wine containers (Freed and Moore 1996: 21).¹⁶ In this case two-thirds of the containers are from 0 to 10 years older than the latest dated container, another one-quarter from 10 to 25 years older than this *amphora*, and just one container older than this, with a date showing that it is 28–9 years older than this vessel.¹⁷ The absence of containers older than this last *amphora* is likely due to the specific settlement history of Carthage, as there was little occupation on the site in the years preceding the establishment of a Roman veteran colony there at roughly the time that this container was filled.

In all three of the instances described above it is unclear whether the older vessels in the groups of containers to which the data pertain remained in the systemic context as long as they did due to the fact that they were held in

TABLE 4.3. *Amphorae* with Dated *tituli picti* from the First Amphora Wall at Carthage

Date of Titulus Pictus	Age in years in 15 B.C.	Reference in Delattre 1894	Class (Dressel)
43 B.C.	28–29	p. 94 no. 1	I
33 B.C.	18–19	p. 94 no. 2	
30 B.C.	15–16	p. 95 no. 3	I?
30 B.C.	15–16	p. 95 no. 4	I?
22 B.C.	7–8	p. 95 no. 5	
22 B.C.	7–8	p. 95 no. 6	
21 B.C.	6–7	p. 96 no. 7	
21 B.C.	6–7	p. 96 no. 8	
19 B.C.	4–5	pp. 96–7 no. 9	
18 B.C.	3–4	p. 97 no. 10	
17 B.C.	2–3	p. 97 no. 11	4 or 6A
16 B.C.	1–2	p. 97 no. 12	
15 B.C.	< 1	pp. 97–8 no. 13	2–4

storage unopened for an unusually long period of time, employed in one or more reuse applications, abandoned in provisional discard for many years, reclaimed from a refuse dump, or some combination of these. Whatever the case, one can at the very least state that these three data sets are compatible with the inferences drawn from the literary sources regarding the use-life of wine *amphorae*, in that they demonstrate that substantial numbers of these containers remained in the systemic context for periods of time ranging up to two decades, and, in some instances, for considerably longer than this.

An *amphora* would have been subject to breakage at several points during its prime-use use-life. Investigation of the wrecks of Roman merchantmen has shown that *amphorae* being transported by sea were packed together in arrangements designed to minimize the amount of shifting that occurred during the course of the voyage, with soft materials such as pine boughs and brush sometimes, perhaps as a rule, inserted between vessels as dunnage to prevent them from chafing against one another (Van Doorninck 1989: 252). Nonetheless, one must imagine that a certain number of the *amphorae* in each cargo did wind up breaking during the course of a voyage. Although there is no way of estimating the incidence of wastage of this sort, a group of *ostraca* from Carthage dated to A.D. 373 may perhaps provide some evidence in this regard (Peña 1998). These documents, which report the results of the inspection of cargos of oil *amphorae* being shipped to Carthage by coasting vessels in connection with state oil collection operations, show that, on the average, four percent of the containers in each cargo were rejected (Peña 1998: 185). Although the reason that these containers failed to pass the



FIGURE 4.1. Fragment of fresco from Caseggiato del Ercole at Ostia depicting two men arguing about broken *amphora*. Courtesy of Soprintendenza per i Beni Archeologici di Ostia.

inspection recorded in these documents is not known, it seems possible that some or all were rejected due to the loss of their content as the result of breakage or holing (as the result of chafing) that had occurred in the course of the voyage.

One must suppose that many *amphorae* were broken due to accidents that occurred while they were being transported over land by wagon or pack animal, transshipped from one form of conveyance to another, or transferred into or out of a storage facility, or while they were being held in such a facility.¹⁸ The aftermath of one such incident may perhaps be depicted in a fresco fragment from the Caseggiato del Ercole, a market building at Ostia (*Regio* 4, *Insula* 2, doorways 2–3), dating to the second half of the second century (Pavolini 1983: 197) (Fig. 4.1). This depicts two men standing opposite one another gesticulating in an animated fashion, while on the ground between them lies a piriform *amphora* that has been split in two horizontally across its belly. To the left of the pair is the figure of a seated man, who seems to be observing the scene. This vignette is perhaps best interpreted as two men arguing before a magistrate in an effort

to establish responsibility for the breaking of the *amphora* and the loss of its content. Given the apparent function of the building in which the fresco was executed, one should perhaps interpret this as a market scene, with the seated figure an aedile (market official).

As discussed in Section 5.1, in many cases the removal of an *amphora*'s content involved either the drilling or the cutting of a hole or a larger aperture in the vessel's neck or shoulder or the breaking or cutting away of the rim and upper part of the neck, rendering it unsuitable for reuse as a packaging or storage container. Some of the more common reuse applications of *amphorae* may also have entailed significant risk of breakage. As discussed in Section 6.3, many examples of some of the smaller classes were apparently reused as water jugs, with a hole punched in the shoulder and, one must assume, a rope tied to one handle to facilitate their filling and retrieval when they were lowered down a well. As is suggested by the large number of these vessels that have been found in some wells, many of these containers must have broken, either when they bumped against the well's lining, or when they were subjected to the strain of being hauled back up after filling. In addition, as discussed in Section 6.1, the reuse of *amphorae* frequently involved their cutting up into sections by means of either sawing or chipping. Because both of these procedures would have been somewhat difficult to control, one must imagine that many such efforts resulted in the ruining of the part of the vessel that the person engaged in the operation intended to detach for reuse.

Finally, it should be remarked that if, as suggested above, the presence of large numbers of empty *amphorae* on the resale market meant that these containers could be purchased at a relatively low cost, then there would have been little incentive to exercise care in their use, aside from the risk of losing the contents if a filled container were to break.¹⁹

4.2.4 / Lamps

Although there is no direct evidence regarding the use-life of lamps, it seems reasonable to assume that they normally remained in use for a relatively brief period of time, in all likelihood substantially less than one year. After a short period of use lamps likely became saturated with oil, rendering them a nuisance to handle and prone to being dropped and broken. Further, as already noted, lamps were exceedingly inexpensive, making replacement cost much less of a consideration than it would have been for vessels belonging to the other functional categories. Also worth noting is the fact that lamps were

regularly employed as votive and grave offerings, meaning that substantial numbers would have been employed in depositional use applications prior to their wearing out or breaking. The relief decoration that is such a prominent feature of molded Roman lamps of the late republic and empire may well have had some relation to the rapidity with which they were consumed and replaced. Lamps may have been, in effect, low-cost novelty items, with models that presented an engaging design more apt to catch the fancy of a prospective buyer.

4.2.5 / *Cookwares*

Cookwares also probably tended to have a relatively short use-life, again likely less than one year. The repeated exposure of cooking vessels to cycles of heating and cooling would have led to the buildup of thermal stress, culminating in either their cracking or breaking. Different wares would have been more or less resistant to thermally induced breakage as a function of the morphology of the various forms represented and the mineralogy and texture of their fabrics, with wares that displayed superior performance in this regard presumably enjoying a market advantage.²⁰ At the same time, the repeated use of vessels such as *ollae* [cookpots] and *caccabi* [casseroles] for the cooking/heating of food or drink may have resulted in the absorption into the vessel wall of food residues and/or the buildup on the interior surface of incrustations of charred food or, if a vessel was used for the boiling of water, a layer of calcium carbonate. These eventually may have rendered a vessel unsuitable for further use, due either to its poor heat transfer characteristics or to the bad taste that it imparted to any food or drink prepared in it.

The length of time that cooking vessels lasted would have been a function of the frequency with which they were used and perhaps also the care with which they were cleaned. The comparative ethnographic evidence suggests that ceramic cooking pots in regular use normally last no more than a year or two, with many vessels breaking or wearing out after a period of no more than a few months (Shott 1996: 466–7, table 2). Worth noting in this connection is the frequency with which recipes in Apicius' *De re coquinaria* (3.2.5, 5.1.3, 5.2.2, 6.9.13, 7.15.6, 9.8.1) and Cato's *De agri cultura* (85, 87) call for the use of a "new" ceramic cooking vessel. This suggests that it may have been a common practice to employ a previously unused cooking vessel when preparing certain recipes, presumably because food residue absorbed in the course of any previous use was held to render a vessel unsuitable. This raises the possibility that cookwares were regarded to some extent as

disposable items, to be used once and then either discarded or relegated to some other role. At the same time, variability in the sooting displayed by cookware assemblages suggests that in many cases different examples of the same form in the same ware were employed for the cooking/heating of food and/or drink a substantially different number of times.²¹

4.2.6 / *Utilitarian Wares*

The several different forms and classes subsumed under the utilitarian ware functional category probably would have remained in use for widely varying periods of time. For example, *mortaria* (flanged bowls with gritting embedded in the interior of the floor that were employed – sometimes presumably in conjunction with a stone or ceramic pestle – for the pulping, grinding, and/or crushing of various foodstuffs and other materials) would have been subjected to considerable punishment, and these vessels presumably broke or wore out after relatively few episodes of use. Some storage jars, in contrast, may have sat on shelves or in storerooms for many years without being disturbed.

4.2.7 / *Tablewares*

Much of the pottery subsumed under the tableware functional category was probably employed on a regular basis for activities that involved repetitive filling and emptying, lifting and setting down, movement from one location to another, stacking and unstacking, and placing into and removal from storage, and it seems likely that these vessels faced a significant probability of being broken through dropping, striking against another object, and similar accidents. It thus seems likely that many vessels in this category remained in use for relatively short periods of time, perhaps on the order of no more than a year.

As discussed in Section 2.3, various forms of evidence indicate that gloss-slipped tablewares were generally regarded as more valuable than vessels belonging to the other pottery classes, and it seems reasonable to assume that for this reason efforts were often made to retain these vessels in use for protracted periods of time, perhaps on the order of several decades, as has frequently been the case with high-quality tablewares (e.g., china) in the modern Western world. Although it should be possible to test this assumption by evaluating sets of gloss-slipped vessels recovered in use-related contexts that can be dated with a high degree of accuracy, such as some of

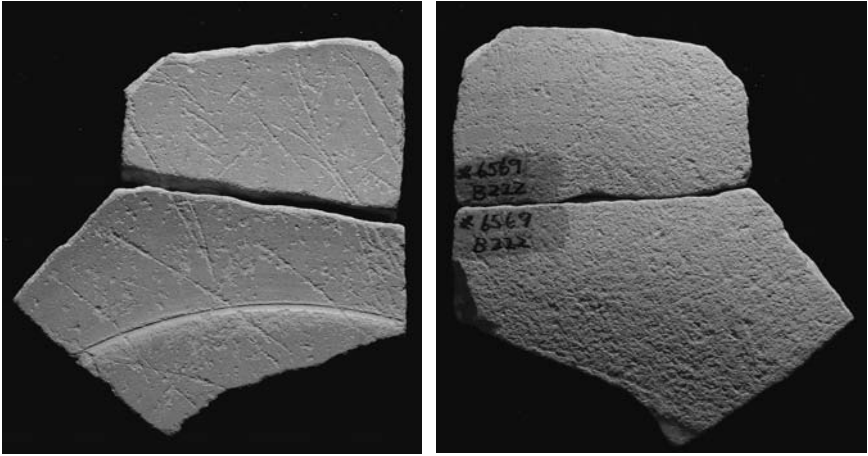


FIGURE 4.2. Two joining fragments from African *sigillata* D Hayes Form 59, 55, or 67 dish from Palatine East site at Rome. Left: Detail of interior surface showing cut marks. Right: Detail of exterior surface showing extensive abrasion. Photos: JTP.

those known from Pompeii and Kourion, no analysis of this kind has been carried out to date.

In instances in which routine forms of use caused damage to vessel surfaces, as would have been the case with gloss-slipped tablewares, the presence of pronounced surface damage on certain parts of a vessel, such as the underside of a ring foot or the floor, may constitute indirect evidence for its protracted use. Here again, students of Roman pottery have shown scant interest in undertaking the systematic evaluation of evidence of this kind.²² An exception is Ward, who in her analyses of the assemblages of Gallic *Sigillata* recovered in the excavations carried out both at Chester and at Piercebridge noted instances of pronounced surface abrasion apparently caused during the period of the vessel's use (rather than during that of its deposition). At Chester, 16 (10–11%) of the 160–66 vessels recovered showed evidence for wear of this kind, including 10 vessels with abrasion on the underside of the ring foot and 6 vessels (1 cup, 2 plates, 2 *mortaria*, and 1 vessel of unidentified form) with abrasion on the floor (Bulmer 1980: 89). Damage of this kind is rare on vessels manufactured during the period ca. A.D. 60–140 and fairly common on vessels manufactured during the period A.D. 140–ca. 200, and, although the data set is a small one, this evidence suggests that the inhabitants of the settlement retained gloss-slipped vessels in use for protracted periods of time as the supply of Gallic *Sigillata*

tailed off during the second half of the second century. At Piercebridge, excavations carried out in various parts of the civilian settlement yielded 6,960 sherds of Gallic *Sigillata* belonging to a maximum of 5,543 vessels. Ward states that the Gallic *Sigillata* from all parts of the site displayed surface damage suggesting prolonged usage, noting, in particular, a group of 30 Dragendorff 38 flanged bowls on which use had led to the abrading away of the slip over the whole of the vessel's floor (Ward 1993: 19). There was a higher incidence of both worn and repaired vessels in contexts of the later second and early third century, suggesting that at Piercebridge, as appears to have been the case at Chester, the inhabitants retained Gallic *Sigillata* vessels in use for protracted periods of time as the level of supply declined (Ward 1993: 20).

Elsewhere, at the Palatine East, of the estimated 732 African *Sigillata* D tableware vessels recovered in contexts dating from the last decade of the third century to the middle of the fifth century, just two or possibly three – all large, flat-bottomed dishes from fills deposited during the terminal portion of this period – show extensive surface damage.²³ In each case this consists of cut marks on the vessel's interior surface combined with extensive abrasion on its exterior surface (Figure 4.2). Although this evidence is highly exiguous, it suggests that the prolonged use of African *Sigillata* D vessels was extremely rare at Rome prior to the fifth century, perhaps becoming somewhat more common at this time, presumably as a response to the reduction and/or protracted interruption of the supply.²⁴ A similar phenomenon has been noted at Tarragona [Tarraco] in eastern Spain, where several vessels in African *Sigillata* D dating to the mid to later sixth century show heavy damage on their interior surfaces that suggests prolonged use (Remola 2000: 120).

5

The Reuse of *Amphorae* as Packaging Containers



This chapter and the two that follow consider the evidence for the behavioral practice of reuse. Reuse played an important role in governing the formation of the Roman pottery record, and for this reason it is subject to comprehensive and detailed treatment in these three chapters.

As defined in Chapter 1, reuse entails the use of a vessel or a vessel part after the conclusion of its employment for its prime-use application. Although reuse ideally follows directly on from prime use, this is not the case in every instance. In some cases a vessel or a part of a vessel damaged in the course of manufacture or distribution is employed for some application different from the vessel's intended prime-use application, and instances of this practice are here regarded as reuse. At the termination of its employment for a particular reuse application, a vessel or a vessel part may be employed yet again for some new reuse application. Whatever the case, the reuse of the vessel or vessel part has the effect of prolonging its retention in the systemic context. A vessel or a vessel part may also be reclaimed either from discard deposition or from an archaeological deposit in order to be utilized for some reuse application. In the latter instance it reenters the systemic context from the archaeological context. At the conclusion of reuse a vessel or a vessel part may be disposed of by means of either discard or recycling.

This chapter considers the evidence for what in Chapter 1 was defined as Type A Reuse – reuse involving an application similar to a vessel's prime-use application without any physical modification to it – in the case of vessels belonging to the *amphorae* functional category. In more direct terms, this consists of the reuse of unmodified *amphorae* as packaging containers. Chapter 6 considers the evidence for the reuse of *amphorae* for what in Chapter 1 were defined as Type B and Type C Reuse, that is, reuse involving an application different from the vessel's prime-use application without any physical modification, and reuse involving an application different from the

vessel's prime-use application involving physical modification, respectively. Chapter 7, in turn, considers the evidence for the reuse of vessels belonging to the other five functional categories of Roman pottery.

This chapter, after a section given over to the discussion of various general considerations, devotes a section to a discussion of the evidence for each of the five different kinds of evidence for the Type A Reuse of *amphorae*, namely, *amphorae* recovered from shipwreck sites that present evidence that they were being reused for packaging; groups of used *amphorae* recovered at facilities that served as venues for the packaging of wine, oil, fish products, fruit, or other substances; *amphorae* stoppered with exotic materials; *amphorae* bearing *tituli picti* that indicate that they were reused as packaging containers; and texts of various kinds that can be interpreted as implying the practice of reusing *amphorae* as packaging containers.

5.1 / General Considerations

From the second century B.C. onward the inhabitants of the Roman world made widespread use of *amphorae* for the packaging of foodstuffs. The regular consumption of the foodstuffs packaged in these containers meant that in many places commercial establishments, residential groups, military units, etc. found themselves in possession of considerable numbers of empty *amphorae* that they were obliged to dispose of in one way or another, either through reuse, recycling, or discard. Various forms of evidence indicate that Romans regularly had recourse to the first of these three options, reusing *amphorae* that had been emptied of their content for a wide variety of applications. In some cases this involved the reuse of *amphorae* for the same purpose as that of their prime-use application, that is, as containers for the packaging of foodstuffs and similar substances.¹

An indefinable, though perhaps very substantial portion of the *amphorae* that had been emptied of their content were suitable for reuse as packaging containers. The extent to which and the specific contexts in which the establishments that served as venues for the packaging of foodstuffs and other items chose to avail themselves of this option are questions of considerable interest. In some cases this practice might have been fairly straightforward, involving the reuse of modest numbers of containers belonging to a locally produced *amphora* class for the packaging of a substance effectively identical to that which had been placed in them on the occasion of their prime use. In others, however, this might have involved the use of a more considerable quantity of containers belonging to one or more classes manufactured in

some other locale or region, sometimes for the packaging of a foodstuff or other substance distinctly different from that which had been placed in them on the occasion of their prime use. Instances of this second kind raise questions regarding the extent to which the various *amphora* classes were associated in the minds of producers, distributors, and consumers with specific regions and/or contents, the ways in which people identified the contents of *amphorae*, the suitability or unsuitability of used *amphorae* of various kinds for the packaging of different types of substances, and the extent to which in some locales the availability of used *amphorae* originating in other locales or regions might have diminished or even removed altogether the need for the manufacture of *amphorae* and/or other kinds of packaging containers.

The Type A Reuse of an *amphora* is here considered to involve the use of a container previously employed for the packaging of wine, oil, fish products, fruit, or some other substance for the packaging of either the same or some different substance. Packaging is understood to involve the use of a vessel not simply as a container for the storage or local transfer (henceforth referred to as *storage*) of the substance in question, but rather as a container for its distribution over some appreciable distance. This may have occurred in the context of market exchange, a redistributive initiative of some kind undertaken either by the state (e.g., the *annona militaris* [military supply] or the *annona urbis* [supply of the city of Rome]) or, during the late imperial period, by the Church (e.g., the provisioning of ecclesiastical officials, charitable initiatives to feed the poor), or self-supply on the part of households or individuals in cases where this involved the transfer of foodstuffs or other substances between properties located at some substantial distance one from the other. It should be emphasized that the distinction between the reuse of *amphorae* as packaging containers and their reuse as storage containers is a significant one from a behavioral point of view. The former presumably involved the systematic collection and reuse of relatively large numbers of containers for a purpose that saw their transport to some location situated a considerable distance from the point where they had been emptied of their prime-use content, often accompanied by the transfer of possession and/or ownership of the containers from one individual or set of individuals to another. The latter, in contrast, generally involved the reuse of a restricted number of containers and/or their reuse in a more casual or adventitious manner for a purpose that saw their transport no more than a short distance from the point where they had been emptied of their

prime-use content, with possession and ownership of the containers often remaining unchanged. The latter practice is here regarded as an instance of Type B Reuse, and the consideration of it is thus deferred to Chapter 6.

It will be helpful at this juncture to establish certain terminological distinctions relating to the prime use and reuse of *amphorae* as packaging and/or storage containers. The use of a newly manufactured, previously unused *amphora* either as a packaging or as a storage container is here regarded as that container's prime use, with the substance placed in it at that time termed the container's *prime-use content*. The utilization of a previously used *amphora* as a packaging or storage container is referred to as that container's reuse, with the substance placed in it at that time termed the container's *reuse content*. As noted in Section 2.2, the evidence suggests that at the time of their prime use the vessels belonging to each individual *amphora* class were generally employed for the packaging of one specific foodstuff, either wine or a wine-related product, olive oil, a fish product of some sort, or one of a limited variety of fruits. In each case, the foodstuff in question is referred to as that class's *principal content*. A content consisting of some other substance, in the context either of a container's prime use or of its reuse, either as a packaging or storage container, is referred to as an *irregular content*. An irregular content that is not included among the restricted group of foodstuffs thought to compose the set of principal contents for *amphorae* in general is referred to as a *nonstandard content*. Thus, olive oil, if placed in an example of an *amphora* class normally employed for the packaging of oil, is considered a principal content, whereas if placed in an example of a class normally employed for the packaging of wine, fish products, or fruit, it is considered an irregular content. Grain, in contrast, if placed in an *amphora* of any class, is considered not only an irregular, but also a nonstandard content.

The frequency with which literary texts and *papyri* refer to *amphorae* by specific names suggests that many inhabitants of the Roman world were able to identify several different classes of *amphorae* at sight, and may have tended to regard each of these as the container for a general type or specific variety of wine, oil, fish product, or fruit (Desbat 2003: 48–9). The practice of reusing *amphorae* as packaging containers might therefore have raised problems stemming from uncertainty regarding the nature of the content of sealed containers. Problems of this kind might have been particularly acute in the context of market exchange transactions, where sellers would have had a motive to misrepresent the content of *amphorae* in instances where these held anything other than some kind of top-quality, high-cost

substance (Frier 1983: 274–89). Pliny (*Naturalis historia* 14.66), for example, states that, when bottled in *lagonae*, *Tauromenitanum*, the wine from the area of Taurominium, modern Taormina, on the east coast of Sicily, was often passed off as *Mamertinum*, the wine from the vicinity of Messina, modern Messina, located somewhat to the north on this same stretch of coast. This implies both that many buyers (perhaps, given the source, specifically retail buyers at Rome during the middle decades of the first century) were inclined to associate a particular kind of small wine *amphora* with *Mamertinum* to the extent that they assumed that any wine bottled in such a container, or perhaps even in one generally similar to it in appearance, was, in fact, *Mamertinum*, and that many sellers were ready to take advantage of this disposition on the part of buyers, selling what was presumably an inferior grade of wine at an elevated price.² Although it is true that the sale of sealed containers of wine was not legally valid until the buyer had either performed a *degustatio* [tasting] and approved the wine as free from acetic fermentation or renounced his right to do so (Frier 1983: 274–89), it seems likely that people such as wholesalers, who regularly engaged in large-scale transactions, would have found it highly inconvenient to open, sample, and then restopper each and every *amphora* of wine that they proposed to acquire. And this says nothing of the problem of ascertaining the nature of the content of *amphorae* filled with oil, fish products, fruit, or some other substance.

The problem of ascertaining the content of a stoppered *amphora* may have been overcome through the provision of each container for which this might reasonably have been considered a question with a *titulus pictus* or some other sort of label identifying the substance that it contained on each occasion when it was filled.³ In the case of *amphorae* being reused as packaging containers, it may have been the practice to remove any *tituli picti* referring to the previous episode of use at the time of their refilling in order to prevent any confusion that might have arisen from the presence of multiple labels. While only a small portion of the *amphorae* recovered in archaeological contexts bear *tituli picti*, it may be that only a minor fraction of these texts – perhaps in the main those rendered in more robust paint that also happened to be deposited in a favorable depositional environment – have been preserved. Galen, in the passage discussed in Section 4.2.3 regarding the length of time that wine was kept stored in *amphorae* (*De antidotis* 14.25–6), implies that the *amphorae* containing Falernian wine from which he selected the wine to be used for the preparation of medicines intended for the emperor – presumably containers being kept in an imperial

storeroom of some sort – each bore a *titulus pictus* indicating the year when the wine had been bottled (and perhaps also an indication that this was Falernian wine). Labels of this kind would have provided a specific, if possibly misleading identification of a container's content, with potential buyers perhaps generally willing to accept this identification at face value in the interest of facilitating the transaction.⁴ Also worth bearing in mind is the fact that this practice would have greatly facilitated the levying of import duties, as it would have allowed state functionaries to identify in ready fashion the content of any *amphora* being transported across a customs boundary, and so to calculate its value for taxation purposes.

The extent to which an individual *amphora* would have been regarded as suitable for reuse as a packaging container would have been conditioned by three factors – the extent to which in being emptied of its prime-use content it had been subject to holing or breakage that compromised its integrity as a container, the presence of a pitch lining, and the presence of absorbed residues of its prime-use content. With regard to first of these factors, a variety of literary sources indicate that it was a common practice to fill wine *amphorae* to a point well below the lip (Cato *De agri cultura* 113; *Tosephta*, Qodoshim Menahoth 9.10; *Geoponica* 7.7), meaning that in opening these containers it would have been possible to cut or break away the rim and upper part of the neck or to drill or cut a hole in the latter without risking the loss of any of the container's content.⁵ A passage from Apuleius (*Metamorphosis* 2.15) appears to allude to such a practice: *et lagoena iuxta orificio caesim deasceato patescans facilis hauritu* [and nearby a *lagoena*, its mouth chopped down by a cut, so that it would be easy to draw from]. Archaeological evidence confirms this point, demonstrating that for several classes of wine *amphorae* it was a normal practice to drill or cut a hole or aperture in the upper part of the vessel. Archaeological evidence also suggests that for some classes of oil and fish products containers the removal of the vessel's prime use content involved the cutting of an aperture in the shoulder or wall or, in some rare cases, even the drilling of a hole through the tip of the spike.

The classes of wine containers for which there is the clearest evidence for this practice are the two main classes of Palestinian wine *amphorae*, the Late Roman 4 and the Late Roman 5–6. Excavations carried out at Caesarea recovered a particularly informative set of data in this regard. Here, contexts belonging to an occupational phase dating to the first half of the seventh century produced large numbers of *amphorae* belonging to both classes.

Of the eighteen Late Roman 5s that preserved at least a portion of their shoulders, no fewer than ten had one or more holes measuring 0.4–0.6 cm in diameter drilled through this part of the vessel (Adan-Bayewitz 1986: 92). These included seven examples with one hole, two examples with two holes, and one example with either five or six holes. Similarly, four of the twelve Late Roman 4s that preserved at least a portion of their shoulders had a single hole drilled through this part of the vessel (Adan-Bayewitz 1986: 98). As most of the examples of these two classes preserved only a small portion of their shoulders, the number that were actually provided with one or more holes of this kind is likely to have been substantially greater than the number for which this could be documented. Examples of these two classes with one or more holes drilled through their shoulders are known from several other sites in the eastern Mediterranean (Adan-Bayewitz 1986: 92 nn. 19–20, 98 n. 50), and it is evident that these apertures served to facilitate the emptying of these vessels' prime-use content (Zevulun and Olenik 1979: 27). To better understand how these holes might have functioned, Adan-Bayewitz carried out a series of experiments using an intact example of a container with a hole drilled through its shoulder that involved various attempts to empty the vessel of a liquid content (Adan-Bayewitz 1986: 94–5). He concluded that the content of a vessel could have been poured from a hole of this kind in a gradual and controlled manner if a second opening of some kind was also made in the vessel's lid or stopper, so that air could enter the vessel at its mouth as the liquid flowed out through the hole in its shoulder. Evidence discussed in Section 6.3 may indicate that other classes of wine *amphorae*, including the Late Roman 3, Forlì *amphora*, and Keay 52, sometimes had holes or larger apertures cut or drilled in their necks or shoulders to facilitate the removal of their prime-use content.

With regard to containers with a principal content of either oil or fish products, Bonifay, in studying *amphorae* belonging to various classes of Tunisian origin from the necropolis at Hammamet (Pupput), in Tunisia, documented four different approaches to the opening of the container that involved its holing (Bonifay 2004: 467–8). These were as follows:

1. The creation of one or two small holes ca. 1–2 cm in diameter, usually by means of a drill, though sometimes by means of punching or chipping, generally in the lower third of the vessel's wall.⁶ This method is attested almost exclusively with examples of the Neo-Punic *amphora*, the “*agradino*” variety of the African 2A, and the Keay 25.

2. The detaching of a more or less circular sherd ca. 10 cm in diameter from the shoulder of the vessel, sometimes apparently by means of chipping and sometimes perhaps by means of sawing, to produce a medium-sized hole. This method is attested exclusively with examples of the African 1 and the “*a gradino*” variety of the African 2A. One example still retained its stopper in place, demonstrating that the operation was undertaken for the purpose of emptying the container of its content.
3. The detaching of a more or less circular sherd ca. 15–20 cm in diameter from the shoulder of the vessel, sometimes apparently by means of sawing, to produce a large hole. This method is attested with three examples of the “*a gradino*” variety of the African 2A.
4. The breaking or sawing off of the tip of a vessel’s hollow spike. This method is attested with a few examples of the Hammamet 1 variety of the Neo-Punic *amphora*.

Methods 1 and 4 suggest that the content of the vessels for which they were employed was a liquid of some sort, presumably either wine or oil, whereas methods 2 and 3 suggest that content of the vessels for which they were employed was a semi-solid fish product.

Amphorae bearing holes similar to those attested in connection with Bonifay’s Methods 2 and 3 are known from elsewhere in the Roman world. Callender stated that he observed several *amphorae* with “large squarish holes cut into the side” in Switzerland, including examples from Windisch and Augst (Callender 1965: 36). As an illustration of this practice he published a photograph of an example of the Beltrán 1, a fish products container from southern Spain, with an oblate hole measuring ca. 8 cm wide by 5 cm high cut in the middle portion of its wall that he identified as being from either Augst or Basel (Callender 1965: Pl. IVb). Although Callender believed that these vessels had been modified to serve as containers for the cold storage of food, it seems more likely that the holes in question were produced to facilitate the removal of the content, presumably fish products of some kind.

Also probably to be noted in this connection is a group of seven modified *amphorae* bearing *tituli picti* from four locations around Pompeii. These containers, known only through their description in *CIL*, were all classified as examples of Schöne 7 (Andreau 1974: 254–5; Manacorda 1977: 127), a category that subsumes several classes of fish products containers from southern Spain, including the Beltrán 2A, Beltrán 2B, and Dressel 7–11

(Panella 1974–5: 151–2 n. 5, 153), and were reported to have had an hole cut in their neck or belly. They include three vessels from a *caupona* [bar] at *Regio* 2, *Insula* 4, doorways 1–13 (*CIL* 4.10284A–C) (Della Corte 1958: 161 nos. 428a, 429–30), two from a *caupona* at *Regio* 2, *Insula* 7, doorway 7 (*CIL* 4.10286A–C) (Della Corte 1958: 162 nos. 432–3), one from a small *atrium* house at *Regio* 6, *Insula* 15, doorway 9 (*CIL* 4.5630), and one from the kitchen of a house probably located at *Regio* 8, *Insula* 5, doorway 5 (*CIL* 4.5637). Mau, in discussing the vessels bearing *CIL* 4.5630 and 5637, stated, “*ut ali usi aptaretur, foramen quadratum incisum est*” [as (the container) was adapted for some other use, a square aperture was cut (in it)], and in his drawing of the *titulus pictus* depicted the apertures in question as rectangular areas roughly the same width as the text. Della Corte referred to the apertures cut into the vessels bearing *CIL* 4.10284A–C as “*finestrette*” [tiny windows], while implying that those cut into the vessels bearing *CIL* 4.10286A–C were of a similar nature (Della Corte 1958: 161, 162). It thus appears that the apertures in all seven of these containers were either square or rectangular and of considerable size. The fact that all seven of these containers likely belonged to a class for which the principal content consisted of a fish product of some kind coupled with the fact that in several cases the hole was apparently cut in such a way as to preserve the vessel’s *titulus pictus* re-enforces the assumption that these apertures were made for the purpose of facilitating the removal of the vessel’s content rather than for some reuse application.⁷

With regard to the second of the three factors that would have conditioned the suitability of *amphorae* for reuse as packaging containers, it seems likely that the provision of a container with a pitch lining on its interior surface would have served to limit its utility for the packaging or storage of at least some foodstuffs. Although it remains impossible to determine what proportion of *amphorae* were provided with pitch linings due both to the irregular preservation of these and the irregular reporting of them in the literature, it is nonetheless clear that containers belonging to several of the *amphora* classes employed for the packaging of wine and fish products were regularly treated in this way. Such would not have been the case with an *amphora* destined for the packaging of olive oil, as oil would have dissolved a pitch lining, rendering it useless as a sealant, while also probably imparting an undesirable smell and/or flavor to the oil held in it (Herron and Pollard 1988: 430). *Amphorae* intended to serve for the packaging of fruit presumably would not have required pitch linings. From these observations it follows that wine and fish products *amphorae* lined with pitch may have been widely

regarded as unsuitable for reuse for the packaging or storage of olive oil, items packed in oil, or any oil-based substances.

With regard to the third factor, the absorption of residues of a container's prime-use content, although it seems unlikely that this would have been an important factor with wine *amphorae*, it has been widely assumed that the difficulties involved in removing absorbed residues from oil and/or fish products *amphorae* would have rendered these vessels, in effect, single-use containers (Rodríguez-Almeida 1999: 235 n. 2, 2000, 125–6; van der Werff 1989: 371; Nieto 1986: 97). The evidence for the reuse of *amphorae* presented in this chapter and in Chapter 6, however, makes clear that oil *amphorae* were on some occasions reused for the packaging and/or storage of wine, oil, fish products, and perhaps also cereals and vegetables, and that fish products *amphorae* were in some instances reused for the packaging and/or storage of fish products and perhaps also wine and cereals.

To package foodstuffs or other substances in used *amphorae* it would have been necessary to have access – preferably convenient access – to a sufficient number of containers in suitable condition. The reconditioning of the containers to be employed, their filling and stoppering, and the negotiation of their eventual transfer to other parties would have been facilitated to some significant extent by the systematic use of examples belonging to a single class, or, failing that, to a restricted number of classes. It thus would have been desirable to make use of containers belonging to a class or classes that were not only of a suitable size, shape, and capacity, but also both available at that time and likely to be available in the foreseeable future in substantial quantities. In addition, the specific examples to be employed would have needed to be free of both residues from their earlier use and a lining considered incompatible with the foodstuff or other substance to be placed in them, and to be free of damage that might have compromised either their fundamental suitability or their longer-term reliability. Given these observations, it seems likely that in many cases the reuse of *amphorae* as packaging containers involved their procurement from wholesale/storage, retail, or disbursement facilities for wine, olive oil, fish products, and/or fruit, where used containers would have been available in bulk on a regular basis, rather than from residences and other small-scale consumers of foodstuffs, or their reclamation from refuse middens or another discard context.

The reconditioning of *amphorae* intended for reuse as packaging containers presumably entailed, at the very least, the washing out of their interiors to remove any residues remaining from their prime-use content and/or debris

that had collected inside them since the time that they had been emptied. In some cases this also might have entailed their pitching or repitching and/or the removal of any *tituli picti* relating to their earlier use.

5.2 / *Amphorae from Shipwreck Sites*

Two forms of evidence either demonstrate or suggest that an *amphora* recovered from a shipwreck site was being reused as a packaging container: the presence inside the *amphora* of the remains of an irregular content, and the presence of damage or wear indicative of one or more previous episodes of use. In addition, a high level of heterogeneity among a group of *amphorae* recovered at a shipwreck site in form and/or fabric may point to the reuse of some or all of the vessels in question as packaging containers. Although evidence of this sort has the potential to reveal a great deal about the reuse of *amphorae* as packaging containers, the *amphora* assemblages from only a small number of Roman-period shipwrecks have been subjected to detailed study, rendering it impossible at present to do more than cite a limited number of cases that represent what might have been a widespread practice.

The presence of the remains of an irregular content inside one or more *amphorae* recovered at a shipwreck site does not in and of itself demonstrate that the vessel or vessels in question were being reused as packaging containers. The crews of merchant ships presumably employed both new and used *amphorae* as containers for the storage of their provisions and of various materials required for the maintenance of the vessel (e.g., pitch, iron fittings) and may well have done so on a regular basis. The recovery at a shipwreck site of a small number of *amphorae* holding the remains of an irregular content should not therefore be taken as unequivocal evidence for the reuse of the *amphorae* in question as packaging containers. To demonstrate this in a definitive fashion it is necessary to recover a quantity of *amphorae* containing the remains of an irregular content that is sufficiently large to render it evident that the containers in question constituted part of the ship's cargo. The number of containers necessary to demonstrate this remains a subjective judgment, based on considerations such as the overall number of *amphorae* present at a shipwreck site, the number of these vessels recovered and examined, and the prospect that the *amphorae* not recovered are likely to have held an irregular content. Even in cases in which a large number of *amphorae* containing the remains of an irregular content are recovered at a shipwreck site, the possibility remains that the containers in question were prime-use containers being employed for the packaging of a large consignment of an

irregular substance. To exclude this possibility it is necessary to demonstrate that the *amphorae* in question were filled at a locale situated at some appreciable distance from the locale in which they were manufactured. Alternatively, the containers in question may bear *tituli picti* or *graffiti* indicating that they were once filled with a substance different from that found inside them.

To date, the only Roman-period shipwreck that has produced unequivocal evidence for the reuse of *amphorae* as packaging containers is the Grado wreck, the remains of a merchantman that went down at the head of the Adriatic Sea, very close to Aquileia, during the middle decades of the second century (Parker 1992a: 197 no. 464; Dell'Amico 1997, 1999). The nonperishable component of the ship's cargo included at least ca. 600 *amphorae*, the bulk of which belonged to four classes, including ca. 200 examples of the African 1, an olive oil container from Tunisia, at least ca. 20 examples of the Tripolitanian 1, an olive oil container from Tripolitania, at least ca. 150 examples of the Knossos 19, a wine container from the Aegean, and an unspecified, although presumably substantial number of examples (ca. 200-plus?) of the Grado 1, a fish products container that probably originated somewhere at the head of the Adriatic (Auriemma 2000). The analysis of residues recovered inside a large subset of the containers belonging to the first three of these four classes indicated that at the time of the ship's voyage the African 1s and Knossos 19s were being employed for the packaging of one variety of fish preserves, whereas the Tripolitanian 1s were being employed for the packaging of a second variety of fish preserves (Auriemma 2000: 38–44). The *amphorae* belonging to all three of these classes were stoppered with disk-shaped sherds cut from containers belonging to the same suite of classes. In contrast, the Grado 1s that were subjected to examination proved to contain no such residues, a fact compatible with the *tituli picti* on these containers, which indicated that they were being employed for the packaging of *liquamen* (Auriemma 2000: 44–5). Passages in both Pliny the Elder (*Naturalis historia* 31.43.94) and Cassiodorus (*Variae* 12.22) indicate that the area at the head of the Adriatic Sea was a significant producer of fish products, and it seems likely that the fish preserves and fish sauce packaged in the containers belonging to all four of these classes originated somewhere in the upper Adriatic region. It thus appears fairly certain that the only prime-use containers in the ship's cargo were the Grado 1s, whereas the African 1s, Tripolitanian 1s, and Knossos 19s were all being reused for the packaging of fish preserves. Unfortunately, there is no evidence that points to the ship's likely destination on its final voyage.

Two alternative scenarios can be proposed to account for this instance of the reuse of *amphorae* as packaging containers (Auriemma 2000: 45). In the first of these, one can posit the existence of two (or perhaps three) facilities for the packaging of fish preserves, each specialized in the packaging of just one of the two different varieties attested among the ship's cargo. These facilities would have collected used containers belonging to just one or two *amphora* classes, in one instance the Tripolitanian 1, and in the other both the African 1 and the Knossos 19 (or, if there were three such establishments, in each case just one of these three *amphora* classes), employing these on a systematic basis as packaging containers for their product. In the second scenario, one can posit the existence of a single facility (or, alternatively, two or more facilities) involved in the packaging of both varieties of fish preserves. This facility would have collected used containers belonging to all three of the classes in question, systematically employing Tripolitanian 1s for the packaging of one variety and the examples of the African 1s and Knossos 19s for the packaging of the other. In both scenarios, the facility or facilities in question would have used stoppers cut from surplus *amphorae* belonging to these same classes to seal the filled containers, perhaps utilizing broken or otherwise unusable vessels for this purpose.

The only other Roman-period wreck that has produced evidence of this kind is San Rossore B, an in-harbor sinking at Pisa [Pisae] dating to the years after 7 B.C. (Bruni 2000: 42–3 and *passim*). In this case, it is somewhat uncertain whether the *amphorae* in question should be regarded as packaging containers or storage containers. Recovered from the spectacularly well-preserved remains of the San Rossore B ship were an unspecified number of Dressel 6As and Lamboglia 2s – both wine containers from northern Adriatic Italy – which proved to contain the remains of a wide array of fruits and nuts, including peaches, plums, cherries, hazel nuts, and chestnuts, as well as non-food substances, including red ochre, arsenic sulfide, and volcanic sand (Bruni 2000: 42–3, 350). Although it appears likely that the containers in question formed part of the ship's cargo, fuller information regarding the number of *amphorae* recovered from the wreck, their arrangement in the ship's hold, and their condition will be required before one can exclude the possibility that these were being utilized for the storage of the crew's rations and ship's stores. Fragments of volcanic rock that were being employed both as ballast and as shims to hold the *amphorae* in place in the ship's hold suggest that the vessel was laded somewhere in the Bay of Naples region before sailing up the Tyrrhenian coast to Pisa. The evidence thus suggests that at the

time that the ship was lost, containers belonging to these two *amphora* classes were being employed for the packaging of various nonstandard substances, including fruits, nuts, and assorted industrial materials, presumably at one or more locations in the upper Adriatic and/or the Bay of Naples region. If this activity was taking place in the former region, then the *amphorae* being employed for this purpose might have been prime-use containers. If it took place in the latter region, however, it seems virtually certain that the vessels in question were used containers.

As was the case with *amphorae* holding the remains of an irregular content, instances in which small numbers of containers displaying damage or wear indicative of multiple episodes of use are recovered from a shipwreck site may represent the reuse of *amphorae* as storage containers rather than as packaging containers. To the author's knowledge, no Roman-period shipwreck has produced unequivocal evidence of this kind for the reuse of *amphorae* as packaging containers. Serçe Limani A, the remains of a merchantman that went down off the coast of Anatolian Turkey during the AD 1020s, however, has provided striking evidence of this kind, and this is worth noting in order to establish what one might expect such evidence to look like (Van Doorninck, Bass, Steffy, Schwarzer, Cassavoy, and Runnels 1988; Van Doorninck 1989: 253–6; Parker 1992a: 398–9 no. 1070). According to the excavators, no fewer than 84 of the 89 Byzantine piriform *amphorae* recovered from this wreck showed extensive damage and/or evidence for repairs (Van Doorninck 1989: 256). This took three distinct forms: gouges inside the vessel's mouth produced when the stopper had been pried out, the evening off of a break left where a portion of the vessel's rim had been broken away, and the carving down of the stumps left where one or both of the vessel's handles had been broken away. Van Doorninck has suggested that the striking evidence for the repair and reuse of the set of containers recovered from this wreck may be the result of efforts to retain *amphorae* in use for as long as possible at a time when ceramic transport jars had been replaced in large measure by skin containers (Van Doorninck 1989: 256).

Elsewhere, Cala Culip 4, already noted in Section 3.2, has produced what can perhaps be regarded as a related form of evidence that points to the possible reuse of *amphorae* as packaging containers. In this instance, in addition to Baetican Thin-Walled Ware and South Gallic Sigillata, the ship's nonperishable cargo included a group of at least seventy-six examples of the Dressel 20, the standard oil *amphora* from southern Spain (Nieto Prieto et al. 1989: 61–74). The majority of these *amphorae* were closed with

irregular, ill-fitting stoppers cut from sherds. This method contrasts with that normally employed for the stoppering of examples of this class, which involved the use of a tightly fitting, purpose-made lid, and the excavators took this as evidence that the containers in question perhaps had been filled and stoppered on more than one occasion (Nieto 1986: 97 n. 20; Nieto Prieto et al. 1989: 82–3, 243). Given the fact that the ship appears to have been engaged in cabotage trading, it should perhaps come as no surprise that the *amphorae* carried aboard it were being reused as packaging containers.

As previously noted, the presence of a high level of heterogeneity in form and/or fabric among a group of *amphorae* recovered from a shipwreck site may constitute evidence that some or all the vessels in question were being reused as packaging containers. This assumption is based on the inference that groups of *amphorae* displaying a high level of heterogeneity in one or more of these attributes likely consist of containers manufactured by several different workshops and that they may well represent sets of *amphorae* collected from various different sources for reuse after having been emptied of their prime-use content.

Because the *amphora* assemblages from exceedingly few Roman-period shipwrecks have been subject to detailed study, in order to illustrate the nature of evidence of this kind it is necessary once again to turn to a shipwreck that postdates this study's lower chronological limit, in this case, Yasi Ada B, the remains of a merchantman that sank off the coast of Anatolian Turkey at some point in or shortly after A.D. 625 (Bass and van Doorninck 1982; Parker 1992a: 454–5 No. 1239). The ship's nonperishable cargo included roughly 900 *amphorae* belonging almost exclusively to two classes, the Late Roman 1 and the Late Roman 2 (Van Alfen 1996: 190). Detailed studies were carried out for a substantial set of the containers belonging to each of these two *amphora* classes (Van Doorninck 1989: 247–53; Van Alfen 1996). In both cases these revealed a pronounced degree of heterogeneity in both form and fabric within the group, leading the researchers who undertook these studies to suggest that the vessel's *amphora*-borne cargo may have been packaged in large measure in reused containers. This inference is supported by the fact that several Late Roman 2s, which bore *graffiti* indicating that they had been used on one occasion for the packaging of either olives or lentils, proved to contain grape seeds, suggesting that at the time that they were loaded aboard the ship they were being employed for the packaging of wine (Van Doorninck 1989: 252–3). Further, one example of the Late Roman 1 had lost one of its handles, producing a break at the

rim and a hole in the shoulder. Both areas had been carefully smoothed down, the latter perhaps for the purpose of inserting a patch of some sort (Van Alfen 1996: 202). In addition, a second example of this class had three grooves gouged into the inside of its mouth, indicating that it had once been unstoppered (Van Alfen 1996: 202–3). It is unclear whether the extensive reuse of *amphorae* attested at this wreck represents a limited response to a specific episode of military conflict, or rather reflects what was a widespread practice in the eastern Mediterranean during the early seventh century (Van Doorninck 1989: 253; Van Alfen 1996: 210–13).

Although no similarly detailed form and fabric analyses are available for sets of *amphorae* recovered at Roman-period shipwreck sites, in some cases detailed information is available regarding the set of *amphora* stamps attested among the set of *amphorae* recovered at a wreck, and a similar form of analysis can be attempted employing evidence of this kind. This approach can be illustrated using the *amphora* stamp evidence provided by Cabrera 3, the remains of a merchantman that went down off the Balearic Islands in or shortly after A.D. 257 (Bost et al. 1992; Parker 1992a: 81 No. 125). Of the 131 *amphorae* recovered from this wreck, at least 124 containers belonging to six different classes appear likely to have belonged to the ship's cargo (Bost et al. 1992: 117–77). The containers belonging to two of these classes likely had a prime-use content of olive oil. These include thirty-four Dressel 20s and sixteen examples of the Dressel 23, the smaller successor to the Dressel 20, also from southern Spain. The containers belonging to the other four classes certainly or probably had a prime-use content of fish products. These include nineteen Almagro 50s, sixteen Almagro 51Cs, and seven Beltrán 72s, all from Portugal, and 32 African 2s, from Tunisia.⁸ Although the *amphorae* that made up the ship's cargo were arranged in the hold by classes, the excavators inferred on the basis of the specific disposition of the containers that all had been brought aboard at the same time, concluding that the vessel was in the course of a long-distance, point-to-point voyage when it sank. More specifically, considering the apparent Iberian provenience of much of the cargo and the location of the wreck in the Balearic Islands, it seems highly likely that the ship was *en route* from the Iberian peninsula to Italy, with Cádiz [Gades] its most probable port of departure, and Ostia/Portus its likely destination (Bost et al. 1992: 200–202).

Examples of three of the four classes of fish products *amphorae* recovered from the wreck bore one or more stamps. The data relating to these are summarized in Table 5.1. Of the nineteen Almagro 50s, seventeen bore

TABLE 5.1. Fish Products *Amphorae* Bearing Stamps from the Cabrera 3 Shipwreck

Class	N. in Cargo	N. Stamped	Die	N. with Stamp
Almagro 50	19	17	1-2) ANN GENIALIS 1 and 2	15
			3) ANGE	1
			4) IVNIOR	1
Beltrán 72	7	3	3) ANGE	3
African 2	32	13	5) CAN	1
			6) CTPOM	1
			7) DO N/AS VL	1
			8) HPC	1
			9) LE . . .	1
			10) LEPMI / BSCD	1
			11) MAR	1
			12) TOP / MAR	1
			13) MARI	1
			14) O	1
			15) TER TI / ASY	1
			16) TOP / HLV	1
			17) TOPOL / . MV. .	1

maker's marks produced using four different dies, three from the workshop of Annus Genialis, and one from the workshop of the Iunii (Bost et al. 1992: 129-30). Three of the seven Beltrán 72s bore maker's marks, all produced using one of the dies from the Annus Genialis workshop also attested on one of the Almagro 50s from the wreck (Bost et al. 1992: 133). Finally, thirteen of the thirty-two African 2s bore stamps, each produced using a different die, representing at least ten, and perhaps as many as thirteen different workshops and/or administrative agencies (Bost et al. 1992: 139-42). This last group of containers also displayed a notable degree of heterogeneity in fabric, with at least two distinct fabrics represented, and form, with three different morphological variants attested, the so-called African 2A, 2C, and 2D (Bost et al. 1992: 137-8, 143). It is of some interest that examples of these three variants were found among a single cargo, as they have been thought to represent three distinct phases in the chronological development of this *amphora* class.

The heterogeneity of a group of *amphorae* with regard to its stamps can be characterized in terms of richness and evenness, with the first of these terms referring to the number of different dies (and/or workshops or administrative agencies) attested per container, and the second referring to the degree to which the stamps made with these dies are distributed over the set of containers in an even fashion.⁹ When these measures are employed to compare

the *amphorae* belonging to the two classes of fish products containers of Portuguese origin with those belonging to the single class of Tunisian origin, the two groups display markedly different levels of heterogeneity. The group of Portuguese *amphorae* is extremely low in richness, with the stamping of twenty containers involving the use of just four dies, for a value of one die for every five *amphorae* ($= 0.20$), representing just two workshops, for a value of one workshop for every 10 *amphorae* ($= 0.10$). The evenness values for this group are also extremely low, as shown by the fact that by removing just two selected examples the first of the two figures just reported can be reduced to roughly one-half of the original value, that is, one die for every nine *amphorae* ($= 0.11$), whereas by removing just one of these same two containers the second of the two figures just reported can be reduced to the minimum possible value, that is, one workshop for 19 *amphorae* ($= 0.05$). In contrast, the group of Tunisian containers has a maximum value for richness in terms of dies, with one die for each *amphora* ($= 1.00$), and a high, perhaps maximum value for this measure in terms of workshops/administrative agencies, with one workshop/administrative agency for every 1–1.3 *amphorae* ($= 0.77$ – 1.00). The high level of evenness that characterizes this group is demonstrated by the fact that the removal of any one example always produces the minimum possible effect on these values.

These observations suggest that the groups of Portuguese fish products containers and Tunisian fish products containers from the Cabrera 3 wreck had enjoyed distinctly different histories prior to being loaded aboard the ship.¹⁰ It seems a fair assumption that the Portuguese *amphorae* went directly from the workshop where they were manufactured to a facility for the packaging of fish products (with the workshop perhaps integrated with this facility), where they were filled and then moved in a limited number of stages to the port where they were brought aboard the ship. The Tunisian containers, in contrast, must have been subject to a substantially more complex set of transfers. All of the *amphorae* in this group had a pitch lining, suggesting a prime-use content of fish products rather than olive oil. Although two of the containers, in fact, were found to contain the remains of fish products, another two proved to hold large quantities of olive pits, suggesting that they contained olives when brought aboard the ship (Bost et al. 1992: 143–4). Although it cannot be excluded that the *amphorae* in this group were prime-use containers being employed for the packaging of fish products and olives of Tunisian origin, with these directed toward Italy via a triangular trade of some kind (Bost et al. 1992: 207), the very high

TABLE 5.2. Presence of Tunisian and Portuguese Fish Products *Amphorae* Among the Cargos of Third- and Fourth-Century Shipwrecks Situated Along Routes Linking Iberia and West Central Italy and Central/Southern Tunisia and West Central Italy

<i>Shipwreck</i>	<i>Location</i>	<i>Almagro 50 Amphora</i>	<i>Almagro 51c Amphora</i>	<i>African 2 Amphora</i>
Cabrera 1	Balearic Islands		X	X
Cabrera 3	Balearic Islands	X	X	X
Cap Blanc	Balearic Islands		X	X
Sud Lavezzi A	B. di Bonifacio	X		
Camarina	S. shore of Sicily			X
Feminamorta	S. shore of Sicily		X	X
Marzamemmi D	S. shore of Sicily			X
Marzamemmi F	S. shore of Sicily	X	X	
Ognina	S. shore of Sicily	X		
Randello	S. shore of Sicily	X		

level of heterogeneity that characterizes this group with regard to stamps, vessel morphology, and fabric, when coupled with the presence of the olive pits in two examples, strongly suggests that these were used containers that had been collected in Iberia for refilling, presumably with locally produced fish products and olives. Comparing the situation with that attested with the Grado wreck, the Portuguese *amphorae* appear to have been prime-use containers analogous to the Grado 1s, whereas the African 2s were reused containers analogous to the African 1s, Tripolitanian 1s, and Knossos 1s from this other wreck.

As part of their analysis of the ship's cargo, the excavators of the Cabrera 3 wreck carried out a comparative study of the shipwrecks in the western Mediterranean that had yielded similar suites of *amphorae* (Bost et al. 1992: 202–7). They identified twenty-one such wrecks dating to a span of time extending from the middle decades of the third century to some or all of the fourth century. As part of their study they compiled data regarding the presence/absence of the various classes of *amphorae* recovered from these wrecks. Among the twenty-one wrecks were four that lay in waters suggesting that the ship had been in transit between Iberia and Italy (or return) when it sank, and six in locations suggesting that the ship had been in transit between south/central Tunisia/Tripolitania and Italy (or return). The *amphora* data for these ten wrecks are summarized in Table 5.2. It is striking that three of the four wrecks located along the Iberia–Italy route (Cabrera 1, Cabrera 3, Cap Blanc) yielded both Portuguese fish products *amphorae* and African 2s, as did one of the six wrecks located along the central/south Tunisia/Tripolitania–Italy route (Feminamorta). These data

suggest that, whatever the correct explanation for the makeup of the fish products component of the Cabrera 3 wreck's *amphora* cargo, it represents what was a common set of practices in the western Mediterranean during the second half of the third and some portion of the fourth century.

Before concluding the examination of the shipwreck evidence it is appropriate to consider one practice relating to maritime transport that should perhaps be regarded as a form of Type A Reuse, namely, the adoption of used *amphorae* as containers for ballast. After offloading their cargos, many Roman merchantmen would have needed to take on a load of ballast to ensure that they would retain good sea-keeping characteristics for their return voyages (McGrail 1989). This would have been the case in particular for ships that transported cargo to Ostia/Portus for distribution to Rome, as the west-central Italy region produced little in the way of exportable goods or foodstuffs that could take the place of these vessels' outbound cargos.¹¹ Epigraphical evidence indicates that a *corpus* of workers known as *saborrarii* ["sand men"] existed at Ostia/Portus from at least the middle of the second century to the early third century (Cébeillac-Gervasoni 1979; Sirks 1991: 264–5). Although there is no explicit information regarding the task that these men performed, the generally accepted interpretation is that they were responsible for collecting ballast sand and then bringing it aboard the ships that were engaged in the transport to Ostia/Portus of foodstuffs in connection with the *annona urbis*. The bulk of these ships were presumably merchantmen carrying cargos of Egyptian grain, grain and olive oil from Tunisia, and south Spanish olive oil. The *saborrarii* would have needed containers of some sort to transfer the sand from the shore- or harbor-front where they collected it first to the quays, and then on board the ships, and it is not unreasonable to suggest that they employed used *amphorae* for this purpose. Given the fact that the population of Ostia probably numbered in the range 20–30,000 during the first two centuries A.D. (Storey 1997: 973, 974–5), there would have been a vast number of empty *amphorae* on hand, and it may have been only logical to make systematic use of these containers for some purpose of this kind.

The practice of collecting ballast sand in used *amphorae* and then stowing it aboard ship in these would have offered several advantages over that of collecting this material in the only other type of container that might have been employed for this purpose, namely, cloth sacks, such as were used, for example, for the packaging of grain,¹² and then either stowing it aboard ship in these or simply dumping it into the hold loose. First, an *amphora*

would have represented a far more robust carrying container than a cloth sack, with a partially filled vessel constituting a convenient and manageable load. Second, sand-filled *amphorae* could have been packed into a ship's hold in such a way as to minimize the shifting of both ballast and cargo during the course of the ship's voyage. Third, ballast sand stowed in *amphorae* would have absorbed little, if any, bilge water, guaranteeing that the sand's weight remained more or less constant during the course of the voyage, while facilitating the removal of bilge water from the hold. Finally, if during the course of a voyage the need had arisen to either reposition or jettison a portion of the ship's ballast, the practice of stowing this in *amphorae* would have greatly facilitated the operation. Upon a ship's arrival at its destination, ballast sand stored in *amphorae* could have been dumped over the side and the empty containers carried ashore, where they could have been discarded, given or sold to an *amphora* broker (see Section 5.5) for resale to fish products packaging facilities and the like, or given or sold directly to a representative of an establishment of this kind located in the port's immediate vicinity.

One may speculate that fish products *amphorae* would have been particularly favored as containers for ballast sand, as they may have been regarded as unsuitable for several other common reuse applications due to the residues that they had absorbed into their walls during the course of their prime use. In addition, *cetariae* may in many cases have been located within a convenient distance of a major port, heightening the economies that could be realized by the practice of reusing *amphorae* that had been employed as ballast containers for packaging operations. This practice might, in fact, lie behind the highly heterogeneous makeup of the set of African 2s from the Cabrera 3 wreck and the larger pattern of mixed cargos of Portuguese and Tunisian fish products *amphorae*.

If it was a common practice to collect and stow ballast sand in used *amphorae*, then one should expect to find instances of shipwrecks containing substantial numbers of sand-filled containers. As the vast majority of *amphorae* from shipwreck sites eventually become at least partially filled with sand regardless of their content at the time that the ship sank, the presence of sand inside such containers has not, as a rule, drawn the attention of investigators, and it has generally been noted only in cases in which the sand inside an *amphora* has differed markedly from the sand that constitutes the normal sedimentary background at the site. Most often this has taken the form of containers found to contain augite-rich volcanic sand at sites where the background sediment consists of quartz sand. The number of

such cases recorded to date is small, consisting of an undefined number of Lamboglia 2s from San Rossore B that were found to contain a mixture of volcanic and sedimentary sand (Bruni 2000: 43, 350–51) and a single Grado 1 from the Grado wreck that was found to contain volcanic sand (Auriemma 2000: 23). Perhaps representing another case is the presence of at least one, and perhaps a larger number of examples of the Apulian (i.e., Brindisi) *amphora* containing *pozzolana* (volcanic ash employed as a reagent in mortar and concrete) from Maïre A, the remains of a ship that went down off the south coast of France during the period ca. 150–1 B.C. (Parker 1992a: 254 No. 631).

5.3 / *Packaging Facilities*

Given the evidence provided by shipwrecks such as Grado 1 and San Rossore B, it should be anticipated that it would be possible to identify facilities for the packaging of fish products, fruit, etc. that employed used *amphorae* in connection with their operations. To date, evidence of this kind is known almost exclusively from Pompeii, where it has been possible to identify three or possibly four such facilities. The value of the evidence provided by these four establishments is, unfortunately, substantially compromised by its generally poor quality. Specifically, because all four facilities were excavated prior to the introduction of modern techniques of recording and publication at Pompeii in the 1970s, there is an absence of detailed and reliable information regarding the *amphorae* that were recovered at them. Further, in the instances in which the *tituli picti* and *graffiti* on these *amphorae* have been published, the containers on which these appeared are classified according to the problematic Schöne–Mau scheme peculiar to Pompeii (see Section 5.5). Despite this problem, the evidence regarding the activities carried out at these facilities and the *amphorae* recovered at them are worth reviewing in detail – to the extent that this is possible – as it does shed at least some light on how *amphorae* might have been reused for the packaging of various foodstuffs in the Bay of Naples region and, to a lesser extent, certain other parts of the Mediterranean, in the years immediately prior to A.D. 79. Outside of Pompeii, excavations at Korinth have uncovered the remains of what may well have been a facility for the processing either of some foodstuff or some other substance at which there were several *amphorae* that had perhaps been assembled for reuse as packaging containers.

The first of the four Pompeian facilities is the *Officina del Garum degli Umbrici* (*Regio* 1, *Insula* 12, doorway 8) (Figure 5.1). This establishment

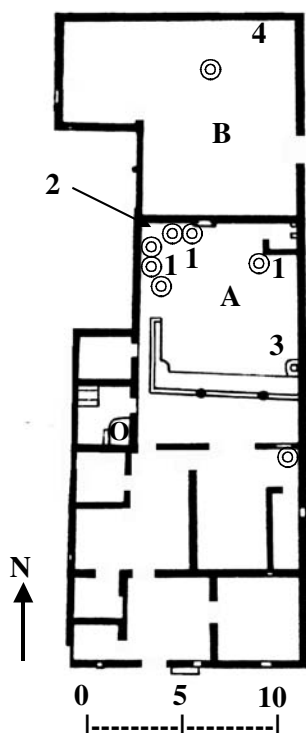


FIGURE 5.1. Plan of Officina del Garum degli Umbrici at Pompeii. A: courtyard. B: garden. 1: *dolia*. 2: upright *amphorae*. 3: basin. 4: inverted *amphorae*. After Van der Poel et al. 1986: 23.

consists of a modest courtyard house with a garden at the rear that was converted to commercial use at some point during the first century (Curtis 1979; Van der Poel, García y García, and McConnell 1986: 22; Wallace-Hadrill 1994: 196). The structure had a room at its front that opened onto the street that may have functioned as a shop.¹³ This room did not, however, contain a masonry counter or shelving, as one might expect had it served for retail activity. The courtyard contained six *dolia defossa*, five in a group in its northwest corner, at least four of which had their mouths covered with a pan tile, and the sixth in its northeast corner. Five of these vessels (those in the northwest corner?) contained the remains of what Curtis concluded was *allec*, the dregs that settled to the bottom of a container of *garum*. One of the *dolia* also contained a small pitcher that presumably served to transfer the *garum* that it held to some other container. Eight *amphorae*, some or all of which also contained the remains of *allec*, were found propped against the wall in an upright position in the northwest corner of the courtyard next to



FIGURE 5.2. *Dolia* and *amphorae* in northwest corner of courtyard of Officina del Garum degli Umbrici. Curtis 1979: 10 fig. 4.

the group of five *dolia defossa* (Curtis 1979: 10). From a photograph of this part of the courtyard taken at the time of its excavation (Figure 5.2) and a second photograph of this same area taken some years later and prior to 1996, at which time it would appear that these containers still remained more or less in situ (Throckmorton 1996: 70), it can be determined that the *amphorae* in this group consisted of one certain, one probable, and one possible example of the Neo-Punic *amphora*, an oil or fish products container of North African origin; two certain and one probable example of the Dressel 2–4 *amphora*, a class that subsumes a variety of morphologically similar wine containers produced in many different parts of the Mediterranean, including the Bay of Naples region; and two examples of the Pseudo-Koan *amphora*, a wine container of eastern Mediterranean origin. In the southeast corner of the courtyard was a small rectangular basin set on a platform ca. 0.5 m high. This was equipped with a drain that emptied into the street through an aperture in the adjoining wall. The garden at the rear of the structure contained a large group of *amphorae* propped against the enclosing wall at its north end (Curtis 1979: 13). A photograph of the garden taken at the time of its excavation (Figure 5.3) shows that this consisted of at least forty-seven, and perhaps as many as ca. sixty *amphorae*, for the most part set in an inverted position. In some areas these were stacked in two tiers, with the mouth of the *amphorae* in the upper tier set over the spike of one of those in the lower.

Although it is difficult to identify with certainty the classes to which these containers belong on the basis of the photograph, they appear to include several Dressel 2–4s, one probable example of the Cretan 2 *amphora*, a wine container produced on Crete, five possible examples of the Dressel 21–22 *amphora*, a fruit container of Campanian origin, and two possible Neo-Punic *amphorae*.¹⁴

Although there is no detailed written description of the *amphorae* recovered at this facility, Curtis has published a brief characterization of these (Curtis 1979: 13). He lists the following: examples of the Schöne 4, a category corresponding to the Dressel 21–22; examples of the Schöne 10, and the Schöne 12, two categories that generally correspond to the Cretan 1 and Cretan 2; containers that appear similar to the Dressel 18, the Dressel 20, and the Dressel 22; and containers that do not belong to the suite of forms included in the Schöne–Mau classificatory scheme. He further indicates that some of the *amphorae* recovered at this establishment bore *tituli picti* indicating a content of *defrutum*, whereas others bore *tituli picti* indicating a content of red wine (Curtis 1979: 14).

On the basis of the evidence available to him, Curtis concluded that this establishment served as a venue for the confection of *garum* (Curtis 1979: 15–18, 21–2). In his view, the *dolia defossa* served as containers for the maceration and then flavoring either of locally caught fish or, more likely, of semifinished fish sauce produced somewhere off the premises, with the



FIGURE 5.3. *Amphorae* in north end of garden of Officina del Garum degli Umbrici. Curtis 1979: 13 fig. 7.

numerous *amphorae* found around the facility – presumably including both those propped upright in the northwest corner of the courtyard and those being stored in the garden – employed for the bottling of the finished product. Alternatively, some of the *amphorae* that were wine containers might have held wine that was employed in the production process. The lack of a space outfitted to serve as a retail shop, combined with the apparent absence of any examples of the Schöne Form 6, a small, two-handled jug, often termed by archaeologists an *urceus*, that appears to have been widely employed for the bottling of fish products for retail sale at Pompeii and Herculaneum (Annecchino 1977: 112, 118 fig. 4.30; De Carolis 1996: 123, 124 fig. 4), led Curtis to infer that this establishment probably sold *garum* in large quantities to retail establishments or exported it in bulk, perhaps for the supply of extralocal markets.¹⁵

This interpretation is an attractive one, in that it posits a set of practices for the packaging of fish products that is broadly similar to that which must have lain behind the packaging of the fish products contained in the reused *amphorae* that were recovered from the Grado wreck. Auriemma, in fact, who studied the *amphorae* from the Grado wreck, has declared the Officina del Garum degli Umbrici a “*scenario virtuale*” for the sort of packaging operations that she supposes must have lain behind the makeup of the fish products cargo being carried aboard the ship (Auriemma 2000: 45). The fact that the *amphorae* stored in the garden of this establishment comprised a disparate group of containers, at least some of which were of nonlocal origin, combined with the fact that they were being stored in inverted position, indicates that they were probably for the most part used *amphorae* that had been emptied of their prime-use content, either on the premises or at some other location, and then either set aside or collected for some sort of reuse application. They were presumably set in inverted position either to facilitate their draining following a cleaning administered to remove residues remaining from their prime-use content (an operation perhaps carried out at the small basin located in the courtyard), to prevent detritus from falling inside while they were being held in storage, or for both of these reasons. This suggests that the anticipated reuse of these containers probably involved refilling them with a foodstuff of some kind.

It is unclear whether *amphorae* belonging to the classes represented among the group were utilized for the packaging of *garum* produced at Pompeii for distribution to extralocal markets, as suggested by Curtis. Two examples of the Schöne 6 *urceus* bearing a *titulus pictus* indicating a content of Pompeian

garum were recovered on the sea floor in the Golfe de Fos, on the Mediterranean coast of France (Liou and Marichal 1978: 165–7, nos. 69–70). The sole *titulus pictus* known from Rome indicating that the vessel on which it appeared contained *garum* of Pompeian origin (CIL 15.4686) is reported as appearing “*in fragmento amphorae*” [on an *amphora* sherd], perhaps suggesting a full-sized *amphora* rather than a Schöne 6. Two Schöne 6s in a fabric suggesting an origin somewhere in the Bay of Naples region have been reported from excavations in the Domus Tiberiana sector of the Palatine Hill (Meylan Krause 2002: 124, 168 No. 119), and a third example has been reported from excavations in the Vigna Barberini sector of the Palatine (Rizzo 2003: 160/7), suggesting that at least a portion of the *garum* produced in this region was distributed to the Rome market packaged in containers of this kind.

It should be emphasized that the evidence for the operations carried out at this establishment admits interpretations other than that advanced by Curtis. For example, it might have received *garum* produced elsewhere, transvasing this into the *dolia defossa* in the courtyard, and then selling it in larger or smaller quantities either to shop keepers and tavern keepers for retailing, or directly to consumers, transferring this to *amphorae* that were kept on hand for this purpose and/or to containers that purchasers brought along with them. The *amphorae* found propped against the wall in the northwest corner of the courtyard might then have been containers in which the *garum* was conveyed to the establishment, in some cases from nearby *cetariae*, in others from extraregional sources, that had yet to have their content emptied into the *dolia*, or *amphorae* either collected by the establishment or left there by local buyers after having been filled with *garum* removed from the *dolia*. Similarly, the *amphorae* stacked in inverted position in the garden might have been containers employed to convey *garum* to the establishment that had had their content emptied into the *dolia* and then been cleaned and stacked for reuse, or used containers that had been collected from a variety of sources for refilling with the *garum* being stored in the *dolia*. The containers in this group may have originated in any number of other ways, however, and been intended for any number of other reuse applications. Indeed, the fact that they represent several different classes with principal contents that included wine, fruit, and either olive oil or fish products may be taken as evidence that the Officina del Garum degli Umbrici was a multipurpose facility that served for the storage, processing, packaging/repackaging, and/or sale of a variety of foodstuffs, perhaps mainly for local distribution, rather than a facility that served exclusively or even primarily for the confection and

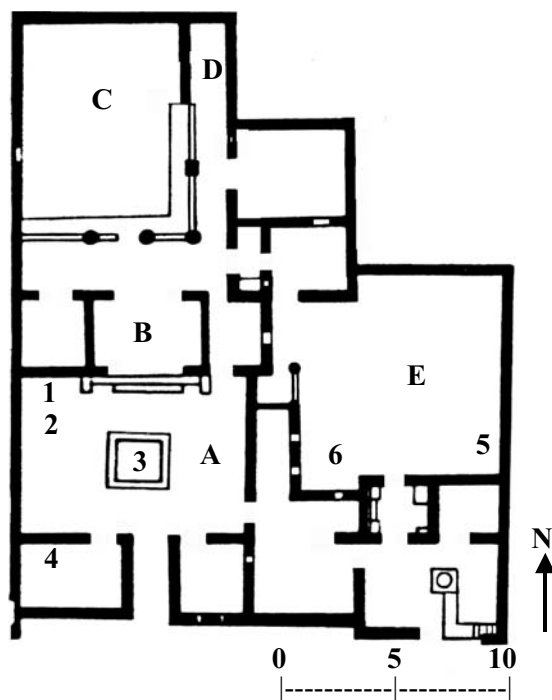


FIGURE 5.4. Plan of Casa di Mestrius Maximus/Lupnar di Amarantus at Pompeii. A: atrium. B: tablinum. C: garden. D: corridor/portico. E: garden. 1. Row 1 of amphorae. 2: Rows 2–9 of amphorae. 3: impluvium. 4: skeletons of mule and dog. 5: inverted amphorae. 6: dumped amphorae. After Van der Poel et al. 1986: 17.

packaging of *garum* for distribution to local and extralocal markets, as argued by Curtis. That this facility provides evidence for the reuse of *amphorae* as packaging containers as defined here is thus by no means certain.

The second such facility that has been identified at Pompeii is the Casa di Q. Mestrius Maximus/Lupnar di Amarantus complex (*Regio* 1, *Insula* 9, doorways 11–12) (Berry 1997b; Fulford 1998) (Figure 5.4). This establishment consists of a small atrium house (the Casa di Q. Mestrius Maximus) joined to a small building of unclear type (the Lupnar di Amarantus). The two structures, which were built during the mid to late first century B.C., appear to have been connected from the outset. The dilapidated state of both structures and the absence of many of the elements of material culture normally associated with residential life, such as cooking and serving utensils, together with the very large number of filled and empty *amphorae* found on the premises, combine to suggest that in the period following the earthquake that struck Pompeii in A.D. 62 the complex functioned principally for a commercial purpose of some sort. A certain Sextus Pompeius

Amarantus is named both in an electoral *programma* on the façade of the Lupanar di Amarantus and in *tituli picti* on two *amphorae* recovered in the building's garden, and it seems highly likely that this individual was the owner of the complex at the time of its destruction in A.D. 79 (Berry 1997b: 122; Fulford 1998: 63, 65 fig. 77).

Pollen analysis undertaken in the Casa di Mestrius Maximus suggests that at the time of the complex's destruction the house's *atrium* was a somewhat damp space that was overgrown with weeds.¹⁶ Excavation carried out in this room uncovered an upturned *dolium* in its southwest corner and a large number of *amphorae* carefully arranged in nine rows in its northwest corner. From a photograph of the *atrium* made at the time of its excavation (Figure 5.5), it can be determined that the *amphorae* in the room's northwest corner consisted of an east–west row of five large containers (here termed Row 1), at least two of which were in an upright position, and at least two of which were in an inverted position, leaned against the north wall of the room, followed immediately to the south by eight more east–west rows of



FIGURE 5.5. *Amphorae* in *impluvium* and in northwest corner of *atrium* of Casa di Mestrius Maximus. Berry 1997a: 184 fig. 1.

somewhat smaller *amphorae* (here termed Rows 2–9), all propped up in an upright position (Berry 1997a: 184 fig. 1, 1997b: 110 fig. 4; Fulford 1998: 64 fig. 76). According to Berry, among these containers were an example of the Rhodian (Dressel 5) *amphora*, a wine container of Aegean origin, and Dressel 2–4s, these last both filled with lime mortar, and more than thirty Cretan wine *amphorae*, mostly Cretan 1s, though including at least two Cretan 3s (Berry 1997b: 113). The examples of the Rhodian *amphora* and Dressel 2–4s must have been among the containers in Row 1, whereas the Cretan wine *amphorae* clearly composed Rows 2–9. From the photograph it can be determined that the eight rows of Cretan *amphorae* contain far more than the thirty containers indicated by Berry, with the number coming to a total of at least fifty-eight, and more likely sixty-one vessels. Further, although it is somewhat difficult to assign these containers to a specific class with certainty, they appear to be more similar in form to the Cretan 2 than to the Cretan 1.¹⁷

Of the *amphorae* stored in the northwest corner of the structure's *tablinum*, those in Row 1 appear to consist of a mixture of *amphorae* that had been emptied of their content and stored in an inverted position for eventual reuse and *amphorae* that were being reused for the storage of construction material. Those in Rows 2–9, on the other hand, were presumably full at the time of the complex's destruction, and, given the uniformity of their appearance, likely represent all or part of a single consignment of wine. As the Cretan 1, Cretan 2, and Cretan 3 all had a capacity in the neighborhood of 20–24 l (Marangou-Lerat 1995: 93), this consignment would have consisted of at least ca. 1,160 l (58×20 l) of wine, and perhaps considerably more.¹⁸ *CIL* 4 includes *tituli picti* from seven containers said to have been recovered in the northwest corner of the *atrium* of this structure, identifying all as examples of the Schöne 8, a category that corresponds for the most part to the Cretan 2 (Panella 1974–5: 154–62; Marangou-Lerat 1995: 77, 130). Five of these (all grouped under *CIL* 4.10439) consist of a text in Greek that should almost certainly be expanded as Κ(λαυδίου)Αντιόχου [*K(laudiou) Antiochou*; belonging to Claudius Antiochus] (Marangou-Lerat 1995: 136). The other two texts (*CIL* 4.10401, 10472), also in Greek, cannot be expanded with certainty.¹⁹ In all likelihood, the consignment of wine in question was offloaded from a merchantman at Pompeii's port, where it was acquired, perhaps from a wine merchant named Claudius Antiochus, either by Amarantus or his representative, who then arranged for the containers to be conveyed to the Casa di Mestrius Maximus for storage.

The same photograph that shows the group of *amphorae* stored in the northwest corner of the structure's *atrium* also shows a group of at least fifteen, and perhaps as many as ca. twenty *amphorae* of various classes lying on their side in a disorderly fashion inside the room's centrally located *impluvium* (a shallow basin that served for collecting rainwater). These include what appear to be nine and perhaps as many as eleven Cretan 2s, two Pseudo-Koan *amphorae*, and one Dressel 21–22. *CIL* 4 includes *tituli picti* from two *amphorae* said to have been recovered in the *impluvium* of this structure, identifying one as a Schöne 8 (*CIL* 4.10455), presumably one of the Cretan 2s visible in the photograph, and the other as a Schöne 12 (*CIL* 4.10420), apparently one of the two Pseudo-Koan *amphorae* visible in the photograph.²⁰ These containers probably represent *amphorae* that had been emptied of their content, perhaps, although not necessarily, in the *atrium*, and then either thrown or placed inside the *impluvium*. Although these vessels might have been tossed into the *impluvium* in a casual manner simply to clear them out of the way until they could be disposed of in some definitive fashion, a more plausible suggestion is that the *impluvium* was being utilized as a basin for cleaning *amphorae* that had been emptied of their content in preparation for their reuse, and that the containers in question were deliberately set inside the *impluvium* on their sides, filled with water, and then left to soak until they could be scrubbed out and rinsed. Whatever the correct interpretation, the mixed nature of this group suggests that it consists of *amphorae* that were emptied over a longer rather than a shorter period of time. For example, the group may have included a number of Cretan 2s that belonged to the consignment of containers a portion of which was still being stored in the room's northwest corner, as well as *amphorae* from consignments of wine (and perhaps other foodstuffs, specifically fruit, given the presence of a Dressel 21–22) that were received at the complex prior to the arrival of this consignment.

Substantial numbers of *amphorae* were also recovered elsewhere in the Casa di Mestrius Maximus part of the complex. These included several containers arrayed along the west wall of the *tablinum* (Berry 1997b: 109), groups of containers lined up along the east and west walls of a small room situated immediately to the east of the *tablinum* (Berry 1997b: 109), several containers in the garden at the back of the premises, and several containers stacked in a corridor/portico that ran along the east side of this space (Berry 1997b: 107). Among the *amphorae* recovered in the garden were seven containers bearing

tituli picti that were published in *CIL* 4. These included four containers identified as Schöne 8s (*CIL* 4.10407, 10415, 10450 [2]), one identified as an example of the Mau 42 (*CIL* 4.10404), a category that cannot be related to any known *amphora* class in a systematic fashion, and two for which no form was indicated (*CIL* 4.10424 [2]). Among those recovered in the corridor/portico were twelve containers bearing *tituli picti* that were published in *CIL* 4. These included nine containers identified as Schöne 8s (*CIL* 4.10273, 10328, 10334, 10399 [2], 10413, 10456, 10476 [2]), two identified as Schöne 12s (*CIL* 4. 10362, 10441), and one identified as a Schöne 13 (*CIL* 4.10442).²¹ Among the *amphorae* recovered in the *tablinum* and/or the room to the east of it may have been the twenty-one containers bearing *tituli picti* published in *CIL* 4 said to have been found in the vicinity of a terracotta wellhead (Berry 1997a: 109). These included fifteen *amphorae* identified as Schöne 8s (*CIL* 4.10285, 10323, 10350, 10353, 10354, 10361, 10414, 10417, 10437, 10440 [4], 10453 [2]), three identified as Schöne 10s (*CIL* 4.10358, 10435 [2]), and three identified as Schöne 12s (*CIL* 4.10357, 10370, 10377).

Elsewhere in the structure, the excavation of the room situated at the southwest corner of the *atrium* uncovered the complete skeletons of a tethered mule and a dog next to the remains of a wooden trough or manger (Berry 1997b: 113, 114 fig. 7; Fulford 1998: 63 fig. 75).

Pollen analysis carried out in the garden of the Lupanar di Amarantus suggests that this space was also an unkempt area at the time of the complex's destruction, and perhaps had been abandoned as a garden (Berry 1997b: 117). A photograph of the garden taken at the time of its excavation demonstrates that a substantial number of intact or largely intact *amphorae* and a second *dolium* were recovered in its northern end (Berry 1997b: 115 fig. 8). None of the *amphorae* from this area appears to have borne a *titulus pictus* that was included in *CIL* 4. Excavation undertaken in the southeast corner of the garden uncovered what Berry describes as "a number of carefully stacked *amphorae*, positioned upside down, and therefore empty, probably in two tiers" (Berry 1997b: 115). A published plan of this excavation shows at least twelve, and perhaps as many as sixteen, *amphorae* in this area (Berry 1997b: 115 fig. 9). These containers were for the most part intact and included what Berry identifies as Dressel 2-4s of Campanian origin, one Gaza *amphora*, some Cretan *amphorae*, and two Aegean *amphorae* (perhaps meaning Pseudo-Koan *amphorae*), all presumably wine containers. These appear to represent *amphorae* that had been emptied of their content and

stacked for eventual reuse in the same manner as the *amphorae* uncovered in the garden of the Officina del Garum degli Umbrici. Excavation undertaken in the southwest corner of the garden revealed a second group of *amphorae*. The plan just referred to shows ca. twelve to fourteen *amphorae* in this area. In this case, Berry indicates that the containers consisted primarily of Cretan *amphorae* and Aegean *amphorae*, along with some Dressel 2–4s of Campanian origin, and a small *amphora* of unspecified class bearing a *titulus pictus* (Berry 1997b: 115–16). Also found in this area were a jug and a broken Italian *Sigillata* bowl. The *amphorae* in this second group were in general less well preserved than those recovered in the southeast corner of the garden, and several were found lying on their side. On the basis of this evidence it appears likely that this second group consisted of containers that had been emptied of their content and placed in the corner of the garden, to be employed for either some sort of Type C Reuse application, recycling, or discard, perhaps in some cases because they had been damaged while being transported, opened, or emptied.

The room at the southeast corner of the Lupanar di Amarantus was outfitted with the type of counter found in *popinae* (wine bars) at Pompeii (Berry 1997b: 121–2). It was, however, in a state of disrepair at the time of the complex's destruction, and it thus appears that during the final period of its operation this establishment did not possess any venue for the sale of wine or other foodstuffs to consumers for immediate consumption.²²

On the basis of this evidence one can surmise that this facility functioned for the storage of wine, in particular certain eastern Mediterranean wines, which were sometimes delivered to it in large consignments. The most plausible assumption is that this wine was distributed to retailers and/or consumers around Pompeii, and also possibly in its hinterland, presumably in allotments of modest size that were perhaps in some cases delivered by a mule kept on the premises. This and possibly other activities carried out by the establishment generated substantial numbers of empty wine *amphorae* of both local and nonlocal origin. Whether these containers were emptied on the premises, with their content transvased into other containers, perhaps including either or both of the *dolia* and/or containers brought to the premises by purchasers, or collected and returned to the facility after they had been emptied at various remote points of consumption is not known. Whatever the case, some of these containers were stacked in inverted position in the garden of the Lupanar di Amarantus for eventual refilling, presumably with a foodstuff of some kind, perhaps after they had been washed out in the

impluvium in the Casa di Mestrius Maximus. Other wine *amphorae*, perhaps for the most part damaged containers, were stored separately and in a more casual manner in the garden of the Lupanar di Amarantus, most likely for some Type C Reuse application, recycling, or discard.

As was the case with the Officina del Garum degli Umbrici, what was done with the used *amphorae* set aside for refilling at this facility is not known. Worth noting, however, is the fact that the part of Pompeii in which the complex is located was given over in substantial measure to urban vineyards, and it may be that these containers were transferred to one or more of these other facilities for filling with wine or must, or that the wine or must produced at one or more of these other facilities or, indeed, at one or more facilities located further afield was conveyed to the Casa di Q. Mestrius Maximus/Lupanar di Amarantus complex in some sort of temporary container for bottling in these. Of interest in this connection is a fresco from a *caupona* at Regio 6, Insula 10, doorway 1, which depicts two men decanting wine into a pair of *amphorae* with an exaggerated fusiform shape from a *culleus* (a large skin container manufactured from the whole of a single ox hide) mounted on a wagon drawn by two horses (Jashemski 1967: 196 fig. 4, 1979, 224 fig. 326).²³ Evidence in the form of *tituli picti*, discussed in Section 5.5, supports the notion that Cretan wine *amphorae* were on some occasions, at least, refilled with locally produced wine at Pompeii, and perhaps also elsewhere in Campania. How common this practice might have been is unclear. It is possible that used containers that had once held imported wine were sometimes employed for the direct distribution of restricted quantities of local wine to suppliers and consumers living in and around the town, whereas newly manufactured Dressel 2–4s, the standard wine *amphora* in Campania, were utilized for the packaging of local wine and wine-related products intended for bulk distribution to extralocal markets.

The third facility of this kind identified at Pompeii is the Casa del Vinario (Regio 9, Insula 9, doorways 6–7). This establishment is a modest *atrium* house with a two-room shop at the front and a large garden at the rear (Sogliano 1887, 1888: 514–16, 1889; Jashemski 1967, 1979: 221–6). The excavation of this facility recovered a total of 114 intact or substantially intact *amphorae*. Fifty-three of these containers bore a *titulus pictus*, a *graffito*, or both, and were published in *CIL* 4 (Jashemski 1967: 200). Among these were seven containers classified as Schöne 6s; two classified as examples of Schöne 7, a category that subsumes the Dressel 7–11, Beltrán 2A, and Beltrán 2B, all fish products containers from southern Spain, as well as the Dressel 6A and

Dressel 6B, the latter an oil container from the upper Adriatic region of Italy (Panella 1974–5: 153; Manacorda 1977: 126); seven classified as Schöne 8s; two classified as Schöne 10s; twenty-two classified as examples of the Schöne 11, a category that subsumes both the Tripolitanian 1, Dressel 26, and Type 2020 *amphora*, a wine container from Sicily (Peña forthcoming); seven classified as Schöne 12s; three classified as Schöne 13s; one classified as an example of the Schöne 15, a category that corresponds to the so-called Carrot *amphora*, a container for dates and perhaps also olives and figs, probably originating in Syro-Palestine (Carreras Monfort and Williams 2002); and one classified as an example of the Mau 29, a category that corresponds to the Dressel 20 (Panella 1974–5: 153; Manacorda 1977: 131).

Of particular interest is a group of twenty-nine *amphorae* found stored in an inverted position in Room O, a medium-sized room opening off the structure's garden. Of the fifteen vessels in this group that bore either a *titulus pictus* or a *graffito*, one was classified as a Schöne 6, one as a Schöne 12, and the remaining thirteen as Schöne 11s. The *titulus pictus* on the Schöne 6 (CIL 4.5718) indicates that it had been employed for the packaging of *alleg*, whereas that on one of the Schöne 11s (CIL 4.5767) suggests that it perhaps had been employed for the packaging of olive oil. The *tituli picti* on the remaining containers from this room (CIL 4.5580, 5748, 5753, 5756, 5787, 5980, 6063, 6163, 6181, 6185, 6186) either indicate or are compatible with a content of wine. In particular, seven of the Schöne 11s bore *tituli picti* that employed the string *MOL* or *STR* to identify the container's content. These are most likely containers for wine or must from Sicily (Peña forthcoming), and not, as stated by Jashemski, *amphorae* that had been reused for the packaging of flour and hand-picked olives, respectively (Jashemski 1967: 198–9, 1979: 223–4). As was the case with the Officina del Garum degli Umbrici and the Casa di Q. Mestrius Maximus/Lupanar di Amarantus complex, the fact that this group represents a disparate set of containers, predominantly of nonlocal origin, found stored in inverted position indicates that these were *amphorae* that had been emptied of their content, either on the premises or at some other location, and then either set aside or collected for refilling, presumably with a foodstuff of some kind, either at this establishment or elsewhere.

The two-room shop at the front of the premises contained a total of twelve *amphorae*, including one identified as a Schöne 10. It was not furnished with a counter, and thus does not appear to have functioned as a *popina*.

Due to the sketchy nature of the information regarding this establishment, it is somewhat more difficult to reconstruct the set of operations carried

out there than is the case with the Casa di Q. Mestrius Maximus/Lupanar di Amantus complex. Although it has been demonstrated that at least a part of this area was under vines (Jashemski 1967: 199), there were no pressing facilities on the premises, and only a single *dolium* that might have been employed for the fermentation of must. This establishment does not therefore appear to have served for the conversion of grapes into wine on a commercially significant scale, as was the case, for example, with the establishment that occupied the whole of *Regio* 2, *Insula* 5 (Jashemski 1979: 201–18). At the same time, the large number of wine containers found on the premises and the presence of a large group of *amphorae*, in all likelihood predominantly Sicilian wine containers, stacked in inverted position for refilling with a foodstuff of some sort suggests that the operations carried out there may have been similar to those carried out at the Casa di Q. Mestrius Maximus/Lupanar di Amantus complex, that is, the storage and distribution of imported wine, and also possibly the bottling and distribution of locally produced must and wine. The shop at the front of the premises may have served as a sales room, in which customers sampled the various wines available and contracted to have specific amounts of these shipped to their residences, bars, or dining establishments.

One additional facility at Pompeii that should perhaps be considered together with the three establishments just described is the Casa della Nave Europa complex (*Regio* 1, *Insula* 15, doorway 3) (Jashemski 1974, 1979: 233–42). This facility consists of two conjoined houses with a large garden at the rear. Jashemsky has argued that the complex functioned as a market garden for the raising of various fruits, nuts, and vegetables. Noting the large number of *amphorae* recovered on the premises, she speculated that these may have been used containers that were intended to serve as packaging for the produce raised there, with a double basin located in one of the houses perhaps used to clean these prior to their refilling (Jashemski 1974: 402, 1979: 242). Although this suggestion is supported by no specific evidence, it is an attractive one, in that it posits a set of practices for the packaging of fruit and nuts that is similar to that which may have lain behind the packaging of the fruit and nuts contained in some of the *amphorae* recovered aboard the San Rossore B wreck, which, as noted in Section 5.2, may have originated somewhere in the Bay of Naples region.

The evidence provided by the four facilities just described remains difficult to interpret. In the first three, substantial numbers of used *amphorae* were found set aside in storage in inverted position, apparently for refilling with

foodstuffs of some kind. Although these may have been *garum* produced on the premises in the case of the Officina di Garum dei Umbrici and local wine or must in those of the Casa di Q. Mestrius Maximus/Lupanar di Amantus complex and the Casa del Vinario, it cannot be demonstrated that this was, in fact, the case. These containers may just as easily have been destined for transfer to some other location to serve some other purpose – e.g., to the Casa della Nave Europa complex for the packaging of fruit and nuts – or to some other place for some Type B Reuse application. Thus, although it would be convenient to claim that the Officina del Garum degli Umbrici provides evidence for packaging practices of the sort reflected by the *amphora* assemblage from the Grado wreck, and perhaps also that the Casa della Nave Europa complex does the same for the San Rossore B wreck, this is by no means certain in either case. Whatever the specific purpose of collecting used *amphorae* and storing them in inverted position, the fact that multiple examples of this practice have been documented at Pompeii suggests that it was a common one there in A.D. 79.²⁴

The only other situation of this kind reported in the literature comes from Korinth, where the excavation of Building 7, a five-room structure situated immediately to the east of the Theater, uncovered what may perhaps be the remains of a facility for the packaging of a liquid of some kind, either a foodstuff or some other substance (Slane 2004). This building, constructed in the early second century, was destroyed by an earthquake in the early fourth century. It consisted of two east-to-west series of rooms arranged side by side, with the northern of the two composed of three rooms (Rooms 1, 2, and 3, from west to east) and the southern of two rooms (Rooms 4 and 5, from west to east). Room 4, the largest of the rooms, which in its earliest phase may have served as the cult room of a *collegium*, was in a second phase converted to a facility for the processing and storage of some unidentified substance. This is indicated by the installation in the southwest corner of the room of an industrial fixture of unidentified function that included what appear from a published photograph (Slane 2004: 363 fig. 2) to be two or three rectangular basins, beneath which were flues for the heating of whatever was held in them, and the installation along the north wall of the room of an east-west row of five *dolia defossa*, one of which (the second from the east) had been cut down to floor level. In a third phase, the three westernmost *dolia* were robbed out, presumably for use at some other locale, the pits left from the removal of these vessels were filled with material containing a substantial amount of refuse pottery, the cut-down *dolium* filled

in and the floor built up by introduction of a layer of earth, and a small hearth constructed against the room's eastern wall. The industrial fixture and the easternmost *dolium* appear to have remained in use in this phase.

The material employed to fill the holes produced by the robbing of the three *dolia* included thirty-six more or less complete pots, among which were twenty-four *amphorae*, two funnels, two jugs, and a pitcher, while the earth used to fill the cut-down *dolium* and build up the floor in the area around the *dolia* contained two additional more or less complete *amphorae* and a bowl modified for use as a funnel, part of which was recovered inside the cut-down *dolium*. Among the *amphorae* recovered in these two stratigraphic units were eight examples of the Kapitän 2 *amphora*, a wine container probably from the Aegean region, two examples of the Middle Roman 4 *amphora*, a probable wine container from the south coast of Anatolia and perhaps also Cyprus, two Rhodian *amphorae*, three examples of the Cretan 4 *amphora*, a wine container from Crete, one or two examples of the Forlì *amphora*, a wine container from the Adriatic coast of Italy, and at least two and perhaps five or more examples of Korinthian *amphorae* (Slane 2004: 364–8). Slane, who studied the pottery from Building 7, concluded that the vessels recovered in these two stratigraphic units were utilized contemporaneously inside Room 4 during the second of the three phases described above, certainly after ca. A.D. 250 and perhaps as late as ca. A.D. 280, conjecturing that the *amphorae* were used containers that had been collected so that they could be refilled with a liquid of some kind being stored in the *dolia* and that had perhaps been produced or processed in the industrial fixture (Slane 2004: 363–4, 368–9). Although this inference seems entirely plausible, it is by no means certain.

It is likely that most sets of materials of the sort just described that are recognizable as such will come from situations involving the preservation of vessels in use-related contexts. Given the great rarity of situations of this kind, the lack of other documented instances of this practice should not be taken as evidence that it was not widespread, either in time or space.

5.4 / *Amphorae Stopped with Exotic Materials*

In some cases it seems likely that *amphorae* bearing stoppers fabricated from materials originating in a region other than the one in which they were manufactured represent vessels reused as packaging containers. This is by no means true in all such cases, because some of the materials regularly employed for the manufacture of *amphora* stoppers (e.g., cork, Tunisian

amphora) circulated widely in the Roman world. In cases in which the material in question did not circulate widely, however, it may be inferred that the container was refilled in the region where this material originated. As *amphorae* are rarely found with their stopper preserved, however, instances of this sort are bound to be exceedingly uncommon. The only example of this kind known to the author, in fact, is a Dressel 2–4 *amphora* of eastern Mediterranean origin found at Quseir al-Qadim [Myos Hormos], an important port on the Red Sea coast of Egypt, that bore a stopper made of sherds of Egyptian origin embedded in plaster (Peacock, Blue, Bradford, and Moser n.d.).²⁵ This vessel was presumably imported into Egypt, emptied of its content, and then refilled with a content of Egyptian origin and stoppered, either for the supply of Quseir al-Qadim or for export from the port located there.

5.5 / *Tituli Picti*

In rare instances Roman *amphorae* bear multiple *tituli picti* that indicate in a clear and unambiguous fashion that they were filled on more than one occasion. Although in some cases it seems possible that both texts served as packaging labels, and thus demonstrate that the vessel on which they appear was reused as a packaging container, in other cases it cannot be excluded that one or both were storage labels that represent either the vessel's prime use or reuse as a storage container. Somewhat more common are *amphorae* that bear a *titulus pictus* indicating that they were filled with an irregular content. Here again, although a text of this kind may represent the reuse of the container on which it appears as a packaging container, it may also represent either its prime use as a packaging container or its prime use or reuse as a storage container. A systematic survey of the entire corpus of published *tituli picti* with the aim of identifying all such texts lies beyond the scope of this study, and this section instead focuses on the evidence presented by the two largest groups of texts included in *CIL*, namely, those from the Vesuvian sites published in *CIL* 4, and those from Rome published in *CIL* 15. This is followed by a briefer consideration of two groups of *amphorae* from late imperial contexts, one from Constanza, in Romania, the other from Milan, in Italy, that bear *tituli picti* suggesting that they might have been reused as packaging containers.

Tituli picti from roughly 2,500 *amphorae* recovered at the Vesuvian sites have been published in the several fascicules of *CIL* 4.²⁶ Unfortunately, the

methods employed for the presentation of these texts have rendered the use of this extremely important body of information highly problematic. In a large proportion of cases the texts are presented in the form of a typed transcription rather than that of a drawing, rendering it difficult or impossible to evaluate the accuracy of the editor's reading. Further, to indicate the kind of *amphora* on which each *titulus pictus* appeared, the editors employed an unsatisfactory typological scheme peculiar to *CIL* 4. This consists of a set of fifteen forms elaborated by Schöne, the editor of the volume's first fascicule (here referred to as Schöne 1–15), to which Mau, the editor of the second fascicule, appended a set of thirty additional forms (here referred to as Mau 15–44).²⁷ Research carried out during the 1970s by both Panella and Manacorda and in the 1990s by Marangou-Lerat demonstrated that although some of the Schöne–Mau forms correspond to a currently recognized *amphora* class in a more or less straightforward and consistent fashion, others subsume two or more distinct and sometimes unrelated classes, whereas still others have no discernible relationship to any one currently recognized class or set of classes (Panella 1974–5, 1977; Panella and Fano 1977; Manacorda 1977; Marangou-Lerat 1995). Table 1 in the Appendix presents the equations that can be made between the several forms in the Schöne–Mau classificatory scheme mentioned in this study and currently recognized *amphora* classes. The research carried out by the scholars just named has also shown that the vast majority of the vessels on which the *tituli picti* published in *CIL* 4 appeared have been lost or destroyed in the years since their excavation.²⁸ It is thus impossible in all but a very limited number of cases to locate a container on which one of these texts appeared in order to ascertain its class or to evaluate the accuracy of the transcription provided in *CIL*. Compounding this lamentable situation is the fact that the several editors of *CIL* 4, Della Corte, in particular, applied the Schöne–Mau classificatory scheme in an inconsistent fashion, while also committing an appreciable number of recording errors.²⁹ On account of these problems it is in many cases difficult or impossible to draw a firm conclusion regarding the specific class of *amphora* on which a particular text appeared, and impossible to reconstruct with any degree of confidence the set of texts that appeared on the containers belonging to any specific *amphora* class. Although it is thus possible to use the evidence provided by *CIL* 4 to identify containers that were employed for the packaging or storage of an irregular content that was also a nonstandard content (e.g., an *amphora* reused for the storage of

TABLE 5.3. *Amphorae* in *CIL* 4 Bearing Multiple *Tituli Picti* Indicating Two Instances of Filling

Reference in <i>CIL</i> 4	Form	Tituli Picti
5526	Schöne 8	1) <i>CRET / EXC / II / P LXXIX</i> <i>TP XVI / M STLAB NYMPH</i> 2) <i>Δ / TAPSAL</i> 3) <i>V VET / MVLSVM /</i> <i>DOMITIANO III / [-] A[---]</i> <i>II COS</i>
5598	?	1) <i>OLIVA / CM / L / Π X</i> 2) <i>RVBR / VET [---] / H</i>

chickpeas), it is not possible to identify with confidence cases in which a container was employed for the packaging or storage of an irregular content included among the set of recognized principal contents (e.g., an instance of a wine *amphora* reused for the packaging of fish products or of a variety of wine different from that normally packaged in the class to which it belongs).

Turning now to the texts, *CIL* 4 contains but two cases in which an *amphora* is documented as bearing multiple *tituli picti*, indicating that it was filled on more than one occasion. The information pertaining to these is presented in Table 5.3. The first of these two vessels is from the villa at La Pisanella, located a short distance outside the walls of Pompeii. This container, identified as a Schöne 8, in all likelihood therefore a Cretan 2, bears three *tituli picti* (*CIL* 4.5526) (Panella 1974–5: 156 n. 33; Marangou-Lerat 1995: 131). The first of these, clearly a packaging label, identifies the container's content as Cretan wine, presents a pair of notations that record the quantity of the vessel's content, and then records an individual's *tria nomina*. The second text is an enigmatic notation that may also relate to the distribution of the container and its content. The third text identifies the vessel's content as *vinum vetus mulsum* [aged sweetened wine] and indicates the year in which it was filled. It might be either a packaging label or a storage label. The second vessel is an *amphora* of unspecified form from the Casa di Gavio Rufo at Pompeii (*Regio* 7, *Insula* 2, doorway 16) that bears two *tituli picti* (*CIL* 4.5598). One of the texts identifies the container's content as olives, and then presents notations of an unclear nature.³⁰ The other indicates a content of aged red wine, followed by a single letter of unclear significance. In neither case is it clear whether the text should be regarded as a packaging label or a storage label. Thus, although the *tituli picti* on these

two containers make clear that both were filled on two occasions, in neither case is it certain that the vessel was in both instances employed as a packaging container.

The editors of *CIL* 4 identified 101 *amphorae* that bore *tituli picti* that they interpreted as indicating that the vessel on which they appeared had been filled with a substance that can be classified as a nonstandard content. The texts on these containers were thought to refer to a variety of substances, including honey, barley meal, fava bean meal, flour, farina, rice, figs, olives, pitted olives, nuts, pepper, chickpeas, lupines, and *psilothrum* (a depilatory unguent). Scholars have generally accepted these identifications uncritically, and they have often been cited as evidence that *amphorae* were regularly reused at the Vesuvian sites for the packaging of a wide array of nonstandard substances (Callender 1965: 39–41; DeVos and De Vos 1982: 127; Jashemski 1967: 198–9, 1974: 402, 1979: 223–4, 242; van der Werff 1989: 372; Will 2001: 263; Jurešić 2000: 11). A review of the evidence, however, reveals that, in fact, only a very small number of these texts indicate in a clear and unambiguous fashion either the use or reuse of the container on which they appear for the packaging of a nonstandard substance.

The only two numerically significant groups of containers identified as having been filled with a nonstandard substance – one a set of thirty-four *amphorae* that bore a *titulus pictus* containing the string *MOL*, which Schöne expanded as *mol(a)* [flour]; the other a set of forty *amphorae* that bore a *titulus pictus* containing the string *STR*, which Della Corte expanded as (*olivae*) *str(ictae)* hand-picked – almost certainly served for the packaging of either wine or must from Sicily.³¹ Removing these two groups of containers leaves just twenty-seven vessels that bore a *titulus pictus* thought to indicate a content consisting of a nonstandard substance. The information pertaining to these containers is summarized in Table 5.4. Six of these vessels do not warrant any further consideration, as the expansions suggested by the editors of *CIL* 4 for the texts that appeared on them are uncertain, unconvincing, or erroneous. These include the containers with texts that were thought to indicate a content of barley meal (*CIL* 4.2567), figs (*CIL* 4.2568 = 5732, 9436), nuts (*CIL* 4.5761), pepper (*CIL* 4.5763), and lupines (*CIL* 4.9420). Another five containers bore texts that appear likely to be storage labels rather than packaging labels. These include the vessels with texts thought to indicate a content of chickpeas (*CIL* 4.5728, 5729, 10751), farina (*CIL* 4.10752), and rice (*CIL* 4.10756).

TABLE 5.4. *Tituli Picti* from CIL 4 Interpreted as Indicating a Content Consisting of a Nonstandard Substance Other than *Mola* or *Olivae Strictae*

Reference in CIL 4	Form	Tituli Picti
Barley Meal		
2567	?	<i>FAR / CISSI</i>
Figs		
2568 = 5732	?	<i>FIC.RIBE / IN VSVS / C. C.<u>VERI</u></i>
9436	?	<i>OM / LLM</i>
Nuts		
5761	?	<i><u>AB</u>.APVLEIO.+ / NVCE.M.</i>
Pepper		
5763	?	<i>PIP</i>
Lupines		
9420	Schöne 11	<i>LVP</i>
Chickpeas		
5728	Schöne 12	<i>CICER / HAL</i>
5729	Schöne 12	<i>CICER / <u>PLAR</u></i>
10751	?	<i>CICER / COLVMB</i>
Farina		
10752	?	<i>HALICA / APVLA</i>
Rice		
10756	?	<i>ORISSA</i>
Honey		
10288	?	<i>MEL.CORSICV.PII</i>
9421	?	<i>+ POMPEI.MELLIS / POMPEIO / <u>PA</u>+++O+++<u>ELRS</u> / <u>GALLI</u> VA+L++++ / <u>D</u>+++</i>
5740	?	<i>1) MEL.P.PCXXXIII / DAT.XXXXXIXS / EPIDIO FORTVNATO 2) T. P. XXVIII / [---]ENS</i>
5741	Schöne 10	<i>MEL.THYM.IMVM.<u>AV</u>[---] / GAVIAE.<u>SEVER</u> [---]</i>
5742	Schöne 14	<i>MELLA / +++ATA / SEX IVLI / SE+TINI / VL.</i>
Lomentum		
5738	Schöne 6	<i>1) [---]MOL[---] 2) LOMENTVM FLOS / EX LACTE ASININO VTICENSE</i>
5737	Mau 16	<i>LOMENT<u>VM</u> GAVIAE SEVERAE</i>
10282	Mau 20	<i>LOMENT.VERAX / NVMICIAE.PRIMICE / C.N.SPERRATI</i>
2597	Schöne 2	<i>LOMENT / CNPS</i>
Olives		
10292	Schöne 3	<i>OLIVAS EX.AQVA</i>

(continued)

TABLE 5.4 (continued)

Reference in CIL 4	Form	Tituli Picti
9437	Mau 26	OLIVA ALBA / PVBLIO TEGETI
2610	Schöne 1	OLIVA ALBADVLCE / P C.E
5762	?	OLIVAS / M.AMPLIA/TI
5598	?	1) OLIVA / CM / L / TI X 2) RVBR / VET [---] / H
Psilothrum		
2613	Schöne 10	1) PSILOTHR / TOTPCLIITPXXV / C.N.PR 2) ΨΘΕ / YA #Θ
2614	Schöne 10	ΘΕ / PSILOT[---] / APX TOTPCXXTPXX / G / PΘ[---]N P[---]

This leaves unaccounted for just sixteen containers with *tituli picti* referring to four different nonstandard contents: *mel* [honey], *lomentum* [fava bean meal], *olivae* [olives], and *psilothrum*. The first of these substances is attested in *tituli picti* on four or possibly five containers. In all five instances these texts appear to be packaging labels. The first container, described by Della Corte as a small *urceus* [jug], bore a one-line *titulus pictus* (CIL 4.10288) that should be expanded to read *mel Corsicu(m) p(ondo) II* [Corsican honey, two pounds]. The second, which Della Corte described as “a small, globular *amphora* with a ring-shaped handle on its belly,” bore a largely indecipherable five-line *titulus pictus* (CIL 4.9421) that appears to indicate that it held honey that was either produced, owned, or distributed by a man named Pompeius and that may perhaps have originated in Gallia. The third container, described simply as an *amphora*, bore two *tituli picti* (CIL 4.5740). One of these is a three-line text that identifies the vessel’s content as honey, presents two enigmatic notations that may record the honey’s quantity, first in weight, then in volume, and then indicates that it was produced by or destined for delivery to a man named Epidius Fortunatus.³² The second text presents an enigmatic notation that may record the container’s tare weight, followed by a partially indecipherable string of letters that may perhaps record a name. The fourth container, identified as an example of the Schöne 10, a category that appears to consist for the most part of Cretan 1s, Cretan 2s, and Cretan 3s, bore a two-line text (CIL 4.5741). The first line is enigmatic, though may indicate that the container was filled with thyme-flavored honey, whereas the second indicates that it was produced, owned, distributed by, or destined for delivery to a woman named Gavia Severa.³³ The fifth and final vessel, identified as an example of the Schöne 14, a category that appears to

correspond to the Beltrán 3, a fish products container from southern Spain, bore a five-line text (*CIL* 4.5742). The first two lines may indicate that the content consisted of honey or a honeyed product of some sort. The next two lines indicate that this was produced, owned, or distributed by a man named Sextus Iulius Se[]tinus, whereas the final line consists of an enigmatic two-letter notation.

The texts on the first two of these five containers appear to indicate that honey from Corsica and also perhaps Gallia was distributed to Pompeii in small transport jars of some kind. This presumably represented the prime use of these containers. This inference is broadly compatible with information provided by *TPSulp.* 80, a fragmentary *tabella cerata* from the Murecine archive, which indicates that honey was imported into the Bay of Naples area by ship during the period in question in containers termed *urnalia Sicula* [Sicilian crocks] (Camodeca 1999). The format of the numerical notation employed in the text on the third container appears to be associated with packaging operations carried out on Crete,³⁴ and one may conjecture that this represents the prime use of a Cretan wine *amphora* for the packaging of honey. The fact that the fourth vessel, which bore a *titulus pictus* indicating what appears to be a content of thyme-flavored honey, may be an example of a Cretan wine *amphora* reinforces this inference. No useful observations can be made regarding the filling and use of the fifth container.

The second of the four nonstandard substances attested, meal made from fava beans, appears in *tituli picti* on four containers. In all four instances these texts appear likely to be packaging labels. The first of these vessels, identified as a Schöne 6, bore a three-line text (*CIL* 4.5738). The first line is only partially preserved and remains enigmatic. The second indicates that the vessel's content was *lomentum flos*, that is, high-quality *lomentum*, and the third, somewhat bafflingly, that this was produced from ass's milk from Utica.³⁵ The second container is identified as an example of the Mau 16, a small, single-handled container, which bore a text (*CIL* 4.5737) indicating that its content consisted of *lomentum* produced, owned, distributed by, or destined for delivery to a woman named Gavia Severa. The third, identified as an example of the Mau 20, a small, flat-bottomed container with two handles, bore a text (*CIL* 4.10282) indicating that its content consisted of *lomentum verax*, that is, "true" *lomentum*, produced, owned, distributed by, or destined for delivery to a woman whose name should probably be expanded as Numicia Primicenia, and produced, owned, or distributed by a man named Gaius N(. . .)Speratus. The fourth and last vessel, identified as

an example of the Schöne 2, a small, flat-bottomed container with two handles that at the time of its recovery was filled with what Schöne termed an “*impasto*,” bore a two-line text (*CIL* 4.2597). The first line indicates that its content was *lomentum*. The second consists of four letters that may represent the abbreviation of an individual’s *tria nomina*.

It is possible to draw little in the way of useful conclusions from the evidence provided by these four vessels. It appears that in some cases small, juglike containers with either one or two handles were employed for the packaging of a substance termed *lomentum*. In no instance, however, is there any indication that this represented the reuse rather than the prime use of these vessels. The fact that the first vessel was an example of the Schöne 6, a container widely employed at Pompeii for the packaging of fish products, together with the fact that the word *flos* (a term widely used in *tituli picti* referring to fish products) was employed to describe the quality of its content, suggests that the word *lomentum* as used in the these texts may perhaps refer to a fish product of some sort rather than to bean meal. Of interest is the fact that the woman named in the *titulus pictus* on the second container, Gavia Severa, is almost certainly the same individual as that named on the *amphora* discussed above that bore a *titulus pictus* that may indicate a content of thyme-flavored honey. Although this raises the possibility that both substances were produced and packaged locally, it may be that Gavia Severa was simply a local distributor of various foodstuffs that were produced elsewhere and shipped to Pompeii.

The third of the nonstandard substances attested, olives, appears in *tituli picti* on five containers. The first, identified as an example of the Schöne 3, a small jar with a single braided handle, bore a one-line *titulus pictus* (*CIL* 4.10292) identifying its content as dry olives. This appears likely to be a storage label. The second, identified as an example of the Mau 26, a small, flat-bottomed *amphora*, bore a two-line *titulus pictus* (*CIL* 4.9437) indicating that its content consisted of white (i.e., green) olives destined for delivery to a man named Publius Tages. This text is clearly a packaging label. The third container, identified as an example of the Schöne 1, a small, two-handled jar (Anzecchino 1977: 112, 188 fig. 4.28; De Carolis 1996: 123, 124 fig. 3), bore a two-line *titulus pictus* (*CIL* 4.2610) indicating that its content consisted of sweet white olives, followed by three letters that appear to be the abbreviation of an individual’s *tria nomina*. This too is likely a packaging label. The fourth, described only as a fragment of an *amphora*, bore a two-line *titulus pictus* (*CIL* 4.5762) recording its content as olives

and indicating that these were produced, owned, or distributed by a man named Marcus Ampliatus. It also appears to be a packaging label. The fifth and final container is the *amphora* of unknown form discussed above that bore two *tituli picti*, one indicating a content of olives, the other a content of aged red wine (CIL 4.5598). As already noted, in neither instance is it clear whether the text should be regarded as a packaging label or a storage label.

In this case the evidence is even less informative than it was for either honey or *lomentum*. All that can be said is that *amphorae*, including in one case a small flat-bottomed container, were sometimes employed for the packaging of olives. In no instance is there any evidence that this involved the reuse rather than the prime use of the container in question.

The fourth and final nonstandard substance attested, *psilothrum*, appears in *tituli picti* on two *amphorae* identified as Schöne 10s.³⁶ As noted, this is a category that appears to consist for the most part of Cretan 1s, Cretan 2s, and Cretan 3s. The first vessel bore two *tituli picti* (CIL 4.2613). The first of these, a three-line text, is clearly a packaging label. The first line identifies the container's content as *psilothrum*. The second presents two numerical notations, the first perhaps the net weight of the container and its content, and the other perhaps the container's tare weight. The third line consists of four letters that are clearly the abbreviation of an individual's *tria nomina*. The second *titulus pictus* on this container, an enigmatic two-line text consisting of six letters in Greek, is presumably a packaging label of some sort. The second *amphora* bears a five-line text (CIL 4.2614) in a mix of Greek and Latin that shows many points of similarity with the first text on the first container, and is also apparently a packaging label. The first line, which consists of two letters in Greek, is enigmatic. The second identifies the container's content as *psilothrum*. The third line begins with three letters, whether Greek or Latin is unclear, that probably represent the abbreviation of an individual's *tria nomina*. This is followed by two notations identical in structure to those in line two of the first *titulus pictus* on the first container. These thus presumably record the net weight of the container and its content and then the container's tare weight. The fourth line contains a single letter, perhaps a letter G, and the fifth a partially undecipherable string of Greek letters. The fourth and fifth lines, or perhaps the fifth line alone, may correspond to the second *titulus pictus* on the first container.

These two containers point to the use of Cretan wine *amphorae* for the packaging of *psilothrum*. The form of notation employed in the *titulus pictus* to record the quantity of the container's content is widespread at Pompeii,

regularly occurring on containers that are most likely examples of Cretan wine *amphorae* (i.e., Schöne 8 and 10) (Andreau 1974: 247–8.). This operation was thus probably carried out on Crete and may well represent the prime use of these containers.

Before the conclusion of this survey of the *tituli picti* from the Vesuvian sites, it is important to note that Marangou-Lerat, who as part of her study of Cretan wine *amphorae* examined the numerous examples of the various classes of Cretan wine *amphorae* held in the storerooms at Pompeii, has stated that she observed several examples of the Cretan 2 that bore *tituli picti* indicating a content of *Trifolinum* (Marangou-Lerat 1995: 142), a wine produced somewhere in Campania (Tchernia 1986: 203, 276). Although Marangou-Lerat does not report the texts on these containers, she does indicate that among them was the container published as *CIL* 4.9330. In this instance, unfortunately, the relevant part of the text consists only of the three letters *TRI*, leaving open the possibility that it refers to something other than *Trifolinum*.³⁷ If, however, Marangou-Lerat is correct in her assumption that these three letters are an abbreviation for *Trifolinum*, and that the other texts that she observed also refer to *Trifolinum*, then these vessels may represent the sort of reuse practices that it was suggested may have occurred at both the Casa di Q. Mestrius Maximus/Lupanar di Amarantus complex and the Casa del Vinario, that is, the bottling of wine for distribution to local (or, perhaps in this case, regional) consumers in used wine *amphorae* that had originally held imported wine. This practice seems to be compatible with the instance discussed above, in which a *titulus pictus* on a probable Cretan 2 from the villa at La Pisanelle indicated that the vessel was refilled with aged *mulsum*.

The uniquely large corpus of *tituli picti* from the Vesuvian sites thus demonstrates that *amphorae* were in some instances filled on more than one occasion and were also sometimes employed for the packaging of a limited set of nonstandard substances. The latter practice included the use of assorted small vessels, perhaps jars more than true *amphorae*, for the packaging of honey, apparently in Corsica and also perhaps Gaul, the packaging of a substance termed *lomentum* – perhaps bean meal, though perhaps a fish product of some kind – possibly in or near Pompeii, and the packaging of olives. In addition, Cretan wine *amphorae* were sometimes employed for the packaging of *psilothrum* and probably also honey, apparently in Crete. Finally, there may also be evidence that Cretan wine *amphorae* were utilized for the bottling of local wine, either at Pompeii or at one or more other locations in Campania.

The infrequency with which *amphorae* from the Vesuvian sites bear *tituli picti* indicating multiple episodes of filling is difficult to interpret, given the possibility that it was a common practice to remove *tituli picti* referring to any earlier use of an *amphora* at the time that it was refilled. The rarity of the cases in which it can be shown that an *amphora* was employed for the packaging of a nonstandard substance, on the other hand, suggests that this practice was uncommon both in the Bay of Naples region and in the several other regions that regularly shipped substances there in *amphorae* during the period ca. A.D. 60–79. Since, for reasons explained above, no attempt was made to identify cases in which *amphorae* were reused for the packaging of substances included among the set of recognized principal contents, the results of this survey shed no light on the incidence of practices of this kind. Worth keeping in mind, however, is the fact that the Bay of Naples region was a major producer and exporter of wine, whereas Pompeii was known for its *garum*, and further studies along the lines of that carried out by Marangou-Lerat for the various classes of Cretan wine *amphorae* may perhaps reveal that *amphorae* were regularly reused at the Vesuvian sites for the packaging of wine and/or fish products.³⁸

Turning next to the corpus of *tituli picti* from Rome, Dressel published ca. 350 such texts from the city and its immediate environs in *CIL* 15.³⁹ While a major portion of the containers on which these texts appeared were recovered in the structured landfill in the Castro Pretorio district of the city, and thus presumably date for the most part to the period ca. 25 B.C. – A.D. 35, the remainder derived from a wide variety of different contexts, with some dating as late as the second half of the third or the fourth century. Thus, although the corpus of published texts from Rome is only a small fraction the size of that from the Vesuvian sites, the chronological sweep that it represents is substantially greater.

There are two cases in *CIL* 15 in which an *amphora* is documented as bearing multiple *tituli picti* that indicate that it was filled on two occasions. The information pertaining to these is presented in Table 5.5. The first is a container from the Castro Pretorio structured landfill that Dressel described as being similar to his Form 8, and thus presumably a fish products container from Spain, which bore two *tituli picti* (*CIL* 15.4570). One of these is a poorly preserved four-line text with a fifth line written in a vertical orientation to the right. Although the reading of this text remains uncertain, it is evident from its structure that it is a packaging label for a fish product of some kind. The other is a two-line text that provides a consular date and identifies

TABLE 5.5 *Amphorae* in *CIL* 15 Bearing Two *Tituli Picti* Indicating Two Instances of Filling

Reference In <i>CIL</i> 15	Form	Tituli Picti
4570	Dressel 8 <i>similis</i>	1) [----] / [----] / CC / <u>L</u> [---] <u>TI</u> // GEMELLI <u>A</u> [---] 2) <i>TI. CAESARE. V. COS / GADITANVM</i>
4718	Dressel 9	1) <i>GF</i> / [----] / [----] 2) <i>LIQ</i> ++

the container's content as *Gaditanum*. Although this might conceivably refer either to *garum* or to oil, *tituli picti* of this format generally refer to wine. If so, this text should be understood as indicating that the *amphora* in question was filled with wine from the area of Gades. It is unclear whether this should be interpreted as a storage label or a packaging label. The order in which these two texts were produced is also uncertain. The second container was an example of the Dressel 9 of unknown provenience, which also bore two *tituli picti* (*CIL* 15.4718). The first of these is a poorly preserved three-line text. The first line indicates that the container held *garum flos* [first-rate *garum*], whereas the second and third lines, entirely illegible, presumably recorded the name of one or two individuals. This text was presumably a packaging label. The second text comprised a single line indicating a content of *liquamen*, followed by two enigmatic signs. It may have been either a packaging label or a storage label. Here again, the order in which the two texts were produced remains unclear. While the *tituli picti* on these two containers demonstrate that they were both filled on two occasions, in neither case is it clear that in both instances they were employed as packaging containers.

There are five instances in *CIL* 15 in which a *titulus pictus* indicates that an *amphora* was filled with a nonstandard substance, in every case olives. The information pertaining to these containers is presented in Table 5.6. Three of these containers are Dressel 23s. Two of these vessels, found somewhere on the Esquiline Hill, bore a two-line text (*CIL* 15.4803 A–B) indicating that they were filled with olives of a variety termed *colonbares*. The third, also perhaps found on the Esquiline, bore a partially illegible two-line text (*CIL* 15.4804), the first line of which indicated a content of olives. The fourth vessel, from the Castro Pretorio deposit, is a container of uncertain class, though perhaps an example of the so-called Funnel-Mouthed *amphora*, a container produced along the upper Adriatic coast of Italy, that bore a partially illegible two-line *titulus pictus* (*CIL* 15.4802) indicating a content of white olives. Although in all four of these instances it is unclear from

TABLE 5.6 *Tituli Picti* from CIL 15 Indicating Content Consisting of a Nonstandard Substance (in Every Case Olives)

Reference in CIL 15	Form	Titulus Pictus
4803A	Dressel 23	OLIVAS / COLONBARES
4803B	Dressel 23	OLIVAS / COLONBARES
4804	Dressel 23	OLIVAS / SA+ATAS
4802	?	OLIVA +LB / EX DVL
4855	Dressel 26 <i>similis</i>	1) IN CELLARIO DOM<I>NORVM / LOLLIANI ET CANDIDI / CC VV / EX SALTVM MARCIANENSI / OLIBARVM COLVMBARVM 2) SATVRNINVS / IVN+OR

the text whether the *titulus pictus* should be considered a packaging label or storage label, the apparent association of this content with the Dressel 23 suggests that this class may have been employed for the packaging of olives on a regular basis. This is by no means difficult to believe, as this class originated in southern Spain and its principal content is assumed to have been olive oil. The fifth and final container, characterized as similar in form to the Dressel 26, was found along the Via Portuense. It bore two *tituli picti* (CIL 6.4855), one a four-line text indicating that it held olives of a variety termed *columbae* – presumably the same as the *olivae colonbares* referred to in the two texts mentioned above – from the storeroom of Lollinaus and Candidus, *vires clarissimi*, which originated at a certain *Saltus Marcianensis*, the location of which remains unknown, the other a two-line text consisting of the name Saturninus Iun[i]or. This text appears to be a packaging label of some sort.

The corpus of *tituli picti* from Rome thus furnishes a picture not dissimilar to that provided by the much larger, if more chronologically restricted corpus of *tituli picti* from the Vesuvian sites, namely, that *amphorae* were sometimes filled on more than one occasion, and that they were also perhaps employed in some instances for the packaging of nonstandard substances, specifically examples of the Dressel 23 for the packaging of olives. Again, as was the case with the Vesuvian sites, in no case do these texts demonstrate that either practice involved the reuse of an *amphora* as a packaging container.

Turning elsewhere, interesting groups of *amphorae* that bear *tituli picti* suggesting the possible reuse of the vessels in question as packaging containers are known from two different contexts of late imperial date. The first of these comes from the Black Sea port of Constanza [Tomis]. Here, excavations carried out in the substructures of the so-called Roman Mosaic Building, a harbor-front structure of late imperial date, recovered a large set of intact or

nearly intact Late Roman 2s and Late Roman 4s that were being employed for the storage of a wide array of nonfood items, including a variety of resins and different sorts of iron hardware (Rădulescu 1973). This apparent instance of the reuse of *amphorae* as storage containers is of considerable interest and is discussed in Section 6.2.2. What is of concern in the present context, however, is the set of *graffiti* and *tituli picti* attested on 29 of the ca. 120 examples of the Late Roman 2, probably an oil container, which the excavators date generally to the fourth to sixth century (Rădulescu 1973: 201–5). Each of the containers in question bore a *graffito* consisting of a number in Latin notation along with from one to three *tituli picti* consisting of a number in Greek notation. Of the twenty-nine vessels, twelve bore at least two numbers in Greek notation (Rădulescu 1973: 204–5 Nos. 2–4, 6, 9, 14–15, 18, 23, 25, 26, 29), and one container bore at least three such numbers (Rădulescu 1973: 205 no. 27). Rădulescu has suggested that the *graffito* might represent the notional capacity of the vessel, whereas the one or more *tituli picti* might represent the volume of its content, both expressed in terms of *sextarii*, with the latter likely produced on the occasion either of the vessel's filling or of its clearance through a customs station (Rădulescu 1973: 204–5).⁴⁰ If these *tituli picti* were, in fact, produced at the time of these vessels' filling, then the high incidence of multiple notations suggests that containers of this class were regularly refilled, perhaps for packaging purposes. This presumably would have occurred somewhere within an economic region that included Constanza, perhaps consisting of the western Black Sea littoral and/or the lower Danube basin.

The second set of *amphorae* bearing *tituli picti* that point to possible reuse as packaging containers during the late imperial period consists of three containers recovered at the San Lorenzo Maggiore ecclesiastical complex in Milan [Mediolanum]. The first of these vessels, found reused in the roofing structure above the vault of the chapel of San Ippolito, consists of an intact example of the Keay 35A, an olive oil and/or fish products container from Tunisia dating from the late fourth to the end of the sixth century (Bocchio 1990c: 146 No. 2a.37f.2).⁴¹ This bore a *titulus pictus* in Greek that can be expanded and translated as follows: οἶ(νου) Χ(ριστὸν) Μ(αρία) Υ(εννῶ) / οἶ(νου) / Κ'Β / μ [(container) of wine; Mary begets Christ; 22 (units) of wine;?]. It is evident from this text that the container on which it appears was employed for the bottling of wine.

The second of the three containers in the group consists of an *amphora* top recovered in the course of the excavations carried out in the Basilica

of San Lorenzo Maggiore. This belongs to an olive oil and/or fish products container of Tunisian origin and is perhaps an example of the Keay 59, a class dating from the late fifth to perhaps as late as the late sixth century (Bocchio 1990c: 147 No. 2a.37f.4).⁴² This bore a *titulus pictus* in Greek that can be expanded and translated as follows: A † ω / αγγῖο(ν) σί(του) / αγγῖο(ν) σί(του) / αγγῖο(ν) σί(του) / αγγῖο(ν) σί(του) / αγγῖο(ν) σί(του) [alpha {cross monogram} omega; blessed (container) of cereal; blessed (container) of cereal; blessed (container) of cereal; blessed (container) of cereal; blessed (container) of cereal]. In this instance it is evident from the text that the container on which it appears was filled with cereal of some sort.⁴³

The third and last container in the group consists of a fragment of the rim and neck of an *amphora* recovered in the same excavations as the second container. It too belongs to an olive oil and/or fish products *amphora* of Tunisian origin, in this instance perhaps an example of the class variant known as the Keay 62Q, which dates to the sixth or seventh century (Bocchio 1990c: 146–7 no. 2a.37f.3).⁴⁴ This bore a *titulus pictus* in Greek that can be expanded and translated as follows: † Ο Ἀντωεί(νου) / † Χ(ριστὸν) Μ(αρία) Υ(εννῶ) / [-----] [{cross monogram} 70 (units); (from the estate) of Antoninus; {cross monogram} Mary begets Christ;?]. In this case the identity of the substance placed in the container is not indicated.

The fact that the *tituli picti* on these three containers were composed in Greek is of unclear significance. Although the use of Greek should probably be taken as an indication that the filling of the containers to which the texts refer took place in the eastern part of the empire, the fact that in all three cases this may have occurred as late as the sixth century leaves open the possibility that the operation was carried out somewhere in the western territories reconquered under Justinian, perhaps, indeed, somewhere in Tunisia. If the filling operation to which the texts refer did take place in Tunisia, then it might, in fact, represent the prime use of these containers. If, on the other hand, it took place outside of Tunisia, it would almost certainly represent their reuse. In either case, the fact that the containers eventually made their way to Milan (even if from no further away than, for example, Ravenna) suggests that they were being used for the packaging of the content to which the *tituli picti* refer rather than for its storage or local transfer.

The presence of Christian slogans and symbols in the texts indicates that this use occurred within the context of a Church-sponsored supply operation of some kind, presumably either a charitable initiative or the provisioning of ecclesiastical officials (Whittaker 1983: 167–9; Karagiorgou 2001:

9–11). This inference is supported by the contexts in which these containers were recovered. The literary sources indicate that the Church undertook a considerable amount of charitable activity involving the distribution of foodstuffs to the poor during the late imperial/early Byzantine period (Durlin 1990: 540–59),⁴⁵ and, if the sort of practices attested by these containers was a regular part of these operations, it seems possible that large numbers of new *amphorae* were filled and/or used *amphorae* refilled, sometimes with nonstandard foodstuffs, and transferred to other locales, sometimes situated at a considerable distance from their point of production or their prime-use destination. The fact that the *tituli picti* on these *amphorae* include conspicuous Christian slogans and/or symbols may relate to the customs exemptions that the *Codex Theodosianus* indicates were granted to clerics during the fourth century (*Codex Theodosianus* 16.2.10 [A.D. 320?], 16.2.8 [A.D. 343], 13.1.11 [A.D. 379]).⁴⁶

The fact that the supply initiative in question may well have involved the use of *amphorae* that previously had been employed for the packaging of olive oil and/or fish products is a point of considerable interest, as it raises the possibility that oil and fish products containers were, in some instances at least, reused for the packaging of wine and cereals. It may even be the case that used olive oil and/or fish products *amphorae* were favored for charitable initiatives, as they tended to have a capacity substantially larger than that of wine *amphorae* and probably could have been acquired either gratis or at a minimal cost. Further, the consumers of foodstuffs distributed within the context of a charitable initiative would have had little choice but to accept these in the condition in which they were proffered. Thus, if the foodstuffs packaged in these containers suffered any adulteration due to residues absorbed into their walls during their prime use, this would have been of limited consequence. This situation can be contrasted with that presented by market exchange, where the slightest degree of product adulteration or, indeed, even the simple suspicion of this may lower the attractiveness of a foodstuff, driving down the price or rendering it all but impossible to sell.

5.6 / Textual Evidence

The fifth and final form of evidence for the reuse of *amphorae* as packaging containers is textual evidence. This consists of two inscriptions from Rome that suggests that *amphorae* were regularly reused in west central Italy for the

packaging of wine at two different points during the imperial period and a passage from Pliny the Elder that may refer to the reuse of oil *amphorae* for the packaging of cabbages.

The first of the two epigraphical texts is an epitaph probably dating to the period ca. A.D. 50–150 said to have been found outside the Porta Salaria (CIL 6.37807) (Wilson 1910: 35–6). This records a certain Gaius Comissius Successus, who is termed a *negotians Porto Vinario lagonaris* [*lagona* trader at the Portus Vinarius]. The Portus Vinarius appears to have been a specialized wine-trading district at Rome, perhaps situated on the right bank of the Tiber River near the site of the early modern Porto di Ripa Grande (Peña 1999: 11–12).⁴⁷ Although it is clear from the textual sources that during the period in question the word *lagona* was most often employed to refer to small-sized wine *amphorae*, most likely classes belonging to the family of small, flat-bottomed containers produced in Sicily, central Italy, and Adriatic Italy, such as the Middle Roman 1, Spello *amphora*, and Forlì *amphora* (Peña 1999: 75–6), it also appears that it could be employed to refer to wine *amphorae* in general or, indeed, to full-sized wine containers.⁴⁸ By considering the role that *amphorae* likely played in the operations that took place in the Portus Vinarius, one can make some educated inferences regarding the nature of Successus' activities. It seems a fair assumption that the activities carried out at the Portus Vinarius would have generated large numbers of empty *amphorae*, as wine brought there in these containers was transferred to the *dolia* housed in the special-purpose *cellae vinariae* [wine storehouses] that are known to have existed in this district. At the same time, these operations would have required the use of large numbers of empty *amphorae*, as shipments of wine arriving in wagon-mounted *cupae* and *cullei* were prepared for storage, sale, or conveyance to buyers, or wine that had been transferred to the *dolia* was readied for sale or conveyance to buyers. In light of these considerations, it seems likely that Successus worked as an *amphora* broker – the term *negotians* suggests activity on a large scale – purchasing empty *amphorae* from traders who no longer had need of containers that had been emptied of their content, and reselling these to others who needed containers in order to take away wine that they had purchased.⁴⁹

A second epitaph from Rome, in this case from a burial facility located along the Via Appia and of uncertain date, may record a second individual involved in activities of this kind (CIL 6.9488). This is dedicated to a certain Leontia, presumably a slave, who is termed an *ad Porta(m) Trigemina(m)*

lagunara [*lagunara* at the Porta Trigemina]. Although the interpretation of the term *lagunara* is unclear, it may perhaps refer to an individual involved in the buying and selling of used *amphorae* (Rodríguez-Almeida 1984: 97).⁵⁰

The presence of brokers such as *Successus* would have greatly facilitated trading operations in places such as the *Portus Vinarius*, where there were concentrations of wine sellers. The systematic reuse of large numbers of wine *amphorae* that would have been the result of the activity of these individuals may account to some extent for the lack of any conspicuous, concentrated deposit of discarded wine containers at Rome analogous to Monte Testaccio, the massive mound of discarded oil *amphorae* located in the city's *Emporium* district (see Section 9.3.2), and, as a consequence, lie behind the difficulties that scholars have encountered in determining the location of the *Portus Vinarius*.

The second epigraphical text that may point to the reuse of wine *amphorae* as packaging containers in the Rome area is a large public inscription recovered in fragmentary condition in the northeastern *Campus Martius* (*CIL* 6.1785 = 6.31931) (Lega 1993; Peña 1999: 177–8). This records what appears to be an edict issued by the *praefectus urbi* that established the amount of money that landowners were obliged to pay, presumably as a gratuity in recompense for their services, to several classes of functionaries involved in the collection of wine being consigned to the state as tax in kind under the land tax. Although the date of this inscription is uncertain, it can be assigned generally to the fourth century, most probably to the period after A.D. 365. At the end of a list of specific functionaries and the amounts of money due them either for each *cupa* of wine or for each receipt issued, and preceding a final entry that appears to indicate the overall amount due for each *cupa* of wine, is the provision: *De ampullis placuit ut post degustationem possessori reddantur* [Regarding the *ampullae*, it has been resolved that these should be returned to the landowner after the tasting (i.e., of the wine)].

Although the reconstruction of the set of operations that this inscription indicates was involved in the consignment of tax wine at Rome remains problematic, the most plausible scenario sees the landowners conveying the wine to the city in *amphorae*, where, following a tasting carried out by representatives of the office of the *praefectus annonae* in order to ensure that it had not soured, the wine was formally accepted by these officials and transferred to *cupae* for storage in a state warehouse. If this reconstruction is correct, then the *ampullae* referred to in the portion of the text highlighted above should be understood to be the containers in which the landowners

had transported the wine from their estates into the city for consignment to the state.⁵¹ According to this interpretation, the word *ampullae*, which is the diminutive form of *amphora*, refers not to flasks, as in normal usage (Hilgers 1969: 102–4), but rather to small *amphorae*, presumably the small, flat-bottomed containers produced in central and southern Italy during the fourth and fifth centuries.

The motive behind the provision that the empty *ampullae* should be returned to the landowner is not entirely clear. On the one hand, the office of the *praefectus annonae* simply may have been interested in devolving onto landowners the responsibility for disposing of the large numbers of empty *amphorae* that would have been an incidental by-product of the consignment operation. Alternatively, the provision may derive from an understanding that, in contrast with the legal opinions concerning the legation of wine discussed in Section 4.2.3, these containers were not regarded simply as an accessory to the wine being consigned as tax in kind, but rather as items of significant intrinsic value, the ownership of which remained with the landowner. Whatever the case, the landowners presumably did one of three things with the empty containers that they found themselves in possession of at the completion of the consignment operation: they discarded them at their earliest possible convenience, they sold them to some third party for eventual reuse – perhaps to *amphora* brokers of the sort discussed above – or they carried them back to their estates for reuse, perhaps for refilling with tax wine.⁵²

Finally, as noted above, a passage from Pliny the Elder (*Naturalis historia* 19.41.142) may refer to the reuse of *amphorae* for the packaging of cabbages. This passage, which is of considerable interest, is here worth reporting in its entirety: ἁλμυρίδια vocant, quoniam nisi in maritumis non proveniunt. aiunt navigatione quoque longinqua virides adservari si statim desecti ita ne humum attingant in cados olei quam proxime siccatos opturatosque condantur omni spiritu excluso. [They call (cabbages of this variety) *halmyridia*, because they grow only in areas close to the sea. They say that these remain green even for a lengthy voyage if, as soon as they are cut and without touching the ground, they are placed in oil *cadi* that have just been dried and these are then stoppered without any air being allowed to get inside.] This passage suggests that it was a regular practice in certain coastal areas where cabbages of the variety under discussion were grown to employ examples of one or more classes of *amphorae* generally regarded as oil containers for the storage and/or packaging of these, including, apparently in some instances, their packaging for

distribution by means of a lengthy sea voyage. Whether this involved the prime use of newly manufactured containers or the reuse of vessels that had been emptied of a prime-use content of oil is unclear, as the verb *siccare* [to dry or drain] might refer either to the removal of ambient moisture absorbed into the walls of either newly manufactured or used *amphorae* or to the elimination from used containers of residues of their prime-use content. The range of containers that Pliny, writing in the middle decades of the first century A.D., might have been referring to as a *cadus olei* includes the Dressel 6B, the Dressel 20, the Neo-Punic *amphora*, and the Tripolitanian 1. It is impossible to estimate the likelihood that any of the regions where these classes were manufactured included a coastal zone known for the raising of cabbages, and thus to evaluate the possibility that the practice that Pliny describes involved the use of newly manufactured rather than used containers.

6

The Reuse of *Amphorae* for Purposes Other than as Packaging Containers



This chapter considers the evidence for the Type B and Type C reuse of amphorae, that is, the reuse of unmodified and modified *amphorae*, respectively, for applications other than that of packaging container. These two types of reuse are here treated together, as in many cases both unmodified and modified *amphorae* were employed in similar ways for similar purposes.

Used *amphorae* must have been available in many parts of the Roman world in what were effectively inexhaustible numbers, and often must have represented something of a nuisance, as in many cases they could not be reused for the packaging of foodstuffs or other substances, in some cases they gave off noxious odors, and they could be disposed of only with the investment of a certain amount of effort. Often they must have been offered either free of charge or at some token cost to any and all who wished to have them. Given these circumstances, it is to be expected that people came to employ used *amphorae* and *amphora* parts for a variety of purposes aside from that of packaging container. *Amphorae* were manufactured in a wide array of shapes and sizes, some with capacities of as much as 150 l, and some more than a meter in height; they were rigid, resilient, and, in most cases, reasonably light; and they could hold liquids, unconsolidated solids, and solid objects of modest dimensions. Further, they could be readily modified in a number of ways – by having one or more holes drilled or punched into the neck, body, or bottom, by being cut down to various heights, by having either their bottom or both their top and bottom removed, or by being sawn or split in half longitudinally. Alternatively, it was possible to detach various elements with a useful shape, including the neck, shoulder/neck, handle, or base/spike, or to break down a vessel into sherds of varying sizes and shapes, which could then be reworked to render them suitable for a variety of applications.

In certain instances textual evidence indicates that *amphorae* were employed for a specific Type B or Type C reuse application, and in some rare cases representational evidence offers a more or less definitive depiction of a specific Type B or Type C reuse application. In the area of archaeological evidence, there are a variety of different indicators that may serve either to demonstrate in a definitive fashion or to suggest that an *amphora* was employed for a Type B or Type C reuse application. These include physical modifications to the vessel, the preservation in situ of some portion of the vessel's reuse content, the presence of wear or damage produced by reuse, and the recovery of the vessel in a context either indicative or suggestive of reuse.

On the basis of evidence of the various kinds just noted it is possible to document twenty-six more or less distinct Type B and Type C reuse applications involving *amphorae* and/or *amphora* parts. These include reuse as a storage container, water jar, urinal, basin, beaker or bowl, incense burner, grinding palette, strainer, boundary marker, libation conduit, funnel, brazier or hearth, lamp cover, prop or support, polishing or grinding implement, *amphora* stopper or removable lid stopper, token or gaming piece, weight, *ostrakon*, label, ossuary, sarcophagus, planter, architectural element, element in a drain, and element in a geotechnical or hydrogeological feature. The last six of these applications represent examples of what in Chapter 1 was defined as depositional reuse, because they entailed the removal of the *amphorae* and/or *amphora* parts in question from regular involvement in the systemic context.

In contrast with the reuse of *amphorae* for the packaging of foodstuffs, which often may have involved the procurement of large numbers of vessels from a wholesale/storage or retail facility, several of the Type B and Type C reuse applications attested for *amphorae* presumably involved either an individual, a household, or a commercial establishment employing one or, at most, a small number of vessels that had been obtained as incidental packaging, that had been procured as used containers from a household or some other small-scale consumer of foodstuffs, or that had been reclaimed from a refuse midden or other discard context. For many of these applications the vessel's condition would have been of little or no consequence. Thus, the fact that an *amphora* had a damaged rim or a pitch lining, or had absorbed residues from its prime-use content, would not have served to limit its suitability for reuse.

This chapter, after a section devoted to a discussion of the various techniques employed for the physical modification of *amphorae*, presents a section

devoted to each of the twenty-six reuse applications listed above. In some cases the evidence for a specific application is sufficiently abundant to allow the inference that it was a common practice in time and/or space, or to permit the identification of chronological and/or regional clusters that appear to represent distinct temporal horizons or geographical traditions of reuse behavior. In other cases, however, an application is attested by only a single instance or a very limited number of instances, making it impossible to discern any patterning of this kind.

6.1 / *The Modification of Amphorae*

The techniques employed for the physical modification of *amphorae* have been of little interest to archaeologists, and the literature contains only two efforts to evaluate these that are of any note. In the first of these, Martin-Kilcher described in general terms the methods employed for the modification of the numerous Dressel 20s recovered in the excavations at Augst and Kaiseraugst, in Switzerland (Martin-Kilcher 1987: 177). In the other, J. Williams published a detailed description of the techniques employed for the modification of four *amphorae* recovered in the excavation of a fifth-century infant cemetery at Poggio Gramignano that had been reused as sarcophagi (Williams 1999).

On the basis of these two studies, passing comments that occur elsewhere in the literature, and published photographs of modified *amphorae* and *amphora* parts it is possible to formulate a generalized picture of the methods employed for the modification of *amphorae* for various reuse applications. These operations involved the use of at least six distinct techniques: sawing, chipping, breaking, drilling, punching, and abrasion. Sawing entailed the use of a saw – presumably of iron or bronze, perhaps in association with an abrasive, such as sand, and with water as a lubricant – to detach a piece from a vessel or vessel part by sawing along a specific line. Chipping involved the use of a chisel, punch, or similar implement either to detach a piece from a vessel or a vessel part by cutting a groove along a specific line – perhaps followed by the application of pressure or the delivery of one or more carefully directed blows to break the piece free – or to chip away small pieces from an edge on a vessel or vessel part. Breaking involved either the use of carefully applied pressure or more or less carefully aimed blows – perhaps aided by an implement such as a punch – to detach a piece of a vessel or a vessel part along a generally established line, or to reduce all or part of a vessel to sherds and various other parts. Drilling involved the use of a

drill – probably of iron, and probably in association with an abrasive, such as sand, and with water as a lubricant – to cut a hole through the wall of a vessel or through a vessel part. Punching involved the use of a punch or similar implement to break a hole through the wall of a vessel. Last, abrasion involved the use of an abrading implement, such as a rasp, or an abrasive material, such as sand, to reshape or smooth the edge on a vessel or a vessel part.

The modification of *amphorae* or *amphora* parts involved one or more of the following eight operations:

Piercing: Drilling or punching was employed to produce one or more holes through the wall of a vessel or through a vessel part.

Detaching a vessel top: Sawing, chipping, or breaking was employed to remove the upper part of an *amphora*. The part removed, here termed an *amphora top*, is considered to include some or all of a vessel's neck, as well as some or all of its rim, handles, shoulder, and/or upper wall, and to represent less than ca. one-half of the vessel's original height.

Detaching a handle: Sawing, chipping, or breaking was employed to remove one or both of a vessel's handles.

Detaching a vessel bottom: Sawing, chipping, or breaking was employed to remove the lower part of an *amphora*. The part removed, here termed an *amphora bottom*, is considered to include some or all of a vessel's base or spike (the long, cylindrical element on the bottom of some classes of *amphorae*, frequently also referred to as a toe) as well as some portion of its lower wall, and to represent less than ca. one-half of the vessel's original height.

Detaching a spike: Sawing, chipping, or breaking was employed to remove all or part of a vessel's spike.

Splitting a vessel: Sawing and/or breaking were employed to split an *amphora* into two large pieces along two more or less vertical lines. This was often undertaken following the detaching of the vessel's top and/or bottom. The pieces produced by this operation are here referred to as *amphora halves*.

Reducing a vessel or vessel part: Breaking was employed to reduce a vessel or a vessel part to two or more smaller parts. When applied to an entire vessel, this commonly yielded sherds of varying sizes and various

other parts, including an *amphora* top, handles, an *amphora* bottom, and/or a spike.

Reshaping a vessel or vessel part: Chipping and/or abrasion were employed to reshape the edge of a vessel or a vessel part.

As discussed in Section 5.1, in many cases the removal from an *amphora* of its prime-use content involved either the drilling or cutting of a hole or a larger aperture in the vessel's neck or shoulder or the breaking or cutting away of the rim and upper part of the neck, and it cannot therefore be assumed that in every case modifications of these kinds were carried out with a view to rendering a vessel suitable for some Type C reuse application.

The literary sources furnish evidence regarding what some of the forms of modified *amphorae* and *amphora* parts referred to above either were called or might have been called by Latin speakers. Thus, an *amphora* pierced by a hole, particularly in its bottom, may have been referred to as an *amphora pertusa* (Cato *De agri cultura* 52.1, 80, 133.3). The expression *curto . . . amphora collo* is used in one instance apparently to refer presumably to an *amphora* with part of its rim/neck removed (Propertius *Elegiae* 4.5.75), whereas, in another case, the term *amphora collo defracto* is presumably used to indicate an *amphora* with its entire rim/neck broken away (Cato *De agri cultura* 88.1). An *amphora* with its rim/neck and shoulders removed may have been termed an *amphora media* (Martial *Epigrammata* 6.93.1). An *amphora* with its bottom removed was perhaps referred to as an *amphora sine fundo* (Varro *De re rustica* 1.15). In one instance an *amphora* neck is referred to as an *amphorae cervix* (Martial *Epigrammata* 12.32.14), whereas the formulation *vertex amphorae* is employed in another case, perhaps to indicate a piece consisting of the rim/neck and shoulders of an *amphora* (Agrimensores *De condicionibus agrorum* 108.6–7). The bottom/base of an *amphora* was presumably called a *fundus* (plural *fundi*), whereas an *amphora* handle was referred to as an *ansa* (plural *ansae*) (Cato *De agri cultura* 113.2; Isidorus *Origines* 16.26.13). Finally, a sherd was referred to as a *testa* (plural *testae*). Because the word *testa* could also be employed to indicate either a ceramic vessel or small crushed or ground terracotta fragment, its precise meaning is often ambiguous when it occurs in a text.¹

6.2 / Reuse as a Storage Container

The evidence suggests that both unmodified *amphorae* and *amphorae* with their tops removed were regularly employed in many parts of the Roman world for the storage of a wide array of foodstuffs and several nonfood

substances, including metal hardware, construction materials, various industrial agents, and coins. It should be emphasized, however, that in many cases the evidence that can be adduced to document the reuse of *amphorae* as storage containers remains to some extent ambiguous. Thus, in instances in which archaeological evidence demonstrates the use of an unmodified *amphora* of local origin as a container for an irregular substance, it may be unclear whether this represents the vessel's initial use or its reuse. Similarly, in many cases in which archaeological or textual evidence points to the reuse of *amphorae* as containers for foodstuffs, it is uncertain whether this represents their reuse as packaging containers or storage containers.

6.2.1 / Reuse as a Storage Container for Foodstuffs

A wide variety of evidence suggests that *amphorae* were commonly reused for the storage of foodstuffs. The various considerations discussed in Section 5.1 regarding the effect that the presence of a pitch lining or the absorption into a vessel's wall of a portion of its prime-use content would have had on its suitability for reuse as a packaging container would also have been relevant to the reuse of *amphorae* as containers for the storage of foodstuffs.

Several passages in the rabbinic literature suggest that Jews regularly reused *amphorae* for the storage of foodstuffs. The most interesting of these is *Tosephta* Nezikin Abodah Zara 4.10, which is concerned with the cleanness under Jewish law of *amphorae* made or used by gentiles:²

קנקנים של גוים חדשות מותרות ישנות זפופות אסורות ושכנם בה גוי מים ישראל ממלא אותה מותר ישר' להכנים לתוכה יין ושמן ושכנם בהן גוי יין ישר' ממלא אותה מים שלשה ימים מעת לעת כונם לתוכה יין ואינו חושש ושכנם בו גוי יין ישר' ציר ומוריים מותר ישר' להכנים לתוכה יין

[*Kankanim* belonging to gentiles – new ones are permitted. Old ones that are old and rubbed are prohibited. And one in which a gentile collected water – (if) an Israelite filled it, an Israelite is permitted also to put wine or oil into it. And if a gentile collected wine in it, an Israelite fills it with water for three whole days, seventy-two hours. (Then) he may collect wine in it without scruple. And in one in which a gentile collected Israelite wine, pickling brine, or brine, an Israelite is permitted to collect wine (adapted from Neusner 1981: 327).]

The author of this text thus authorizes three different kinds of reuse – the reuse of an *amphora* formerly employed as a container for water as a container for wine or oil, the reuse of an *amphora* formerly employed as a container for wine as a container for wine, and the reuse of an *amphora* formerly employed as a container for wine, pickling brine, or brine as a container for wine. These presumably would have been normal practices. Although one cannot be certain that what the author had in mind was the reuse of vessels as storage as opposed to packaging containers, the general tenor of the language seems to suggest that this was the case.

Another passage in the rabbinic literature, *Mishnah* Nezikin Babba Metzia 3.8, in discussing the portion of foodstuffs that can be subtracted for wastage when they are deposited with another person for safekeeping, allows for a 1.5% reduction in the volume of olive oil due to the fact that a certain amount will be absorbed into the walls of the vessel in which it is stored, specifying, however, that no such allowance should be made in cases where the oil in question has been bottled in old *kankanim*. On the basis of this text one can infer that it was a normal practice among Jews to reuse *amphorae* for the storage of oil.

Various other sources allude to the use of *amphorae* for the storage of a wide array of irregular foodstuffs. In perhaps the most interesting of these, Julian (*Digesta* 50.16.206), a jurist active during the second century, states:

Julianus libro sexto ex Minicio ‘*Vinaria*’ vasa proprie vasa torcularia esse placet: dolia autem et serias tamdiu in ea causa esse, quamdiu vinum habent, cum sine vino esse desinerent, in eo numero non esse, quoniam ad alium usum transferri possent, veluti si frumentum in his addatur. Eandem causam amphorarum esse, ut, cum vinum habeant, tum in vasis vinariis, cum inanes sint, tum extra numerum vinariorum sint, quia aliud in his addi possit.

[Julian, *Minicius*, book 6: It is accepted that, properly speaking, “wine containers” are those vessels associated directly with the wine press. *Dolia* and *seriae*, however, should be assigned to this category only so long as they actually hold wine. When they have been emptied of wine they should no longer be designated as wine containers, because they can be given over to some other use, as when grain is placed in them. The same holds true for *amphorae*: when they hold wine they should be considered wine containers, but when they are empty they should not, because some other substance might be placed in them.]

Elsewhere, Varro (*De re rustica* 1.58.1), writing about the storage of beans, recommends that these be placed *in vasis oleariis* [in oil vessels],³ whereas Columella (*De re rustica* 2.10.16), in discussing methods for the storage of lentils, states: *si maior est modus, in horreo, si minor, in vasis oleariis salsamentariisque* [If the quantity is greater, (these can be placed) in a storage bin, if less, in oil or fish sauce vessels]. Speaking in more generic terms, Columella recommends the storage of raisins (*De re rustica* 12.16.3) and figs (*De re rustica* 12.17.1) in *amphorae*, whereas *Mishnah* Tohoroth Kelim 4.2 implies that *chabiyot* were employed on a regular basis to store dried figs. Whether these passages shed light on the reuse of *amphorae* is unclear, however, because in no case is it certain that what the author had in mind was the reuse of containers that had been emptied of their prime-use content rather than the initial use of newly manufactured vessels.

The corpus of published *papyri* includes numerous texts in which *amphorae* are referred to as containing irregular substances. Although a systematic survey of these documents carried out with a view to identifying all such instances lies beyond the scope of the present study, Mayerson's survey of references in the corpus of Egyptian *papyri* to just two types of *amphorae*, those known as the ἀσκαλόνιον [*askalónion*] and the γαζίτιον [*gazítion*] (Mayerson 1992), suggests that an undertaking of this kind would pay rich dividends. The results of this study are of considerable interest and are worth reviewing in detail here. Mayerson compiled a list of all references in the documents to containers referred to by these two names, noting the number of vessels and the identity of their content. He did not, unfortunately, present information regarding the nature and the date of the documents or the specific context in which the containers are mentioned. The first of the two terms, *askalónion*, was likely used to refer to the Zemer 53, whereas the second, *gazítion*, was probably employed to indicate the Late Roman 4, both wine containers from Palestine. Of the twelve references to *askalónia* that Mayerson identified, three specify a content of wine (twenty containers, four containers, three containers), whereas nine indicate a content consisting of some other foodstuff, including three that specify cheese (sixteen containers, twelve containers, six containers), three that specify sweetmeats (five containers, one container, one container), one that specifies fish (two containers), one that specifies fish sauce (one container), and one that specifies beans (one container). Similarly, of the thirteen references to *gazítia* recorded, two indicate a content of wine (thirty-nine containers, thirty-nine containers), whereas another eleven indicate a content of some other

foodstuff or substance, including one that specifies sweetmeats (fifteen containers), one that specifies what may be wool (nine containers), two that specify pickled or salted fish (seven containers, two containers), two that specify pistachios (one container, one container), one that specifies wheat meal (one container), one that specifies groats of rice-wheat (one container), one that specifies bread (one container), one that specifies cakes (two containers), and one that specifies what may be pickled food of some sort (one container). Whether these documents relate to the initial use of containers for the packaging of their principal content or a nonstandard content or the reuse of containers as packaging containers or storage containers is, however, largely unclear in the absence of information regarding the specific contexts in which the containers are mentioned. The difference between the mean number of containers in the groups indicated as having a content of wine – 21 – and the mean number of containers in the groups indicated as having some other content – 4.5 – is striking and may reflect the difference between, on the one hand, sets of prime-use containers being employed for the packaging of their principal content and, on the other, vessels being reused as packaging or, perhaps more likely, storage containers. If so, it would appear that examples of these two *amphora* classes were regularly reused in Egypt for the storage of a broad array of foodstuffs.

Another *papyrus*, *P.Iand* 99, provides detailed evidence for the reuse of imported wine *amphorae* for the bottling of locally produced wine in Egypt (Rathbone 1983: 90–91). This document, datable to the early third century, regards operations on an agricultural estate probably located in the Oxyrhynchite nome. It refers to the tasting of wine from a part of the estate referred to as the Nikolais that had been bottled in what are termed ξενικοκεράμια [*xenikokerámia*; i.e., foreign *amphorae*]. The document goes on to report on the stocks of foreign wines on hand, stating that there would be a need to replenish the supply of wine held in two types of containers, termed Ἀδρειάναϊ [*Hadreíanaï*] and Ἀμινναίαι [*Aminnaíai*], while noting that the supply of wine held in containers of a third type, termed Τμολίτικαι [*Tmolítikai*], was adequate. If these three container names reflect the main types of imported wine consumed on the estate, then it seems likely that the foreign wine *amphorae* available for reuse for the bottling of locally produced wine would have included examples of the Forlì *amphora*, the probable container for *Hadrianum* (i.e., the wine from the area of Adria [*Hadria*], and the Adriatic coast of Italy more generally), the Middle Roman 1, a container that probably served for the packaging of Sicilian wine made from the *aminaeum*

grape (Peña 1999: 75–6), and the Late Roman 3, the likely container for *Tmolites*, the wine produced in the region of Mount Tmolos in western Anatolia (Peña 1999: 84). These are all small containers, with capacities in the range of 6–20 liters (Peña 1999: 76, 84, 194). The more common classes of wine *amphorae* manufactured in Egypt, in contrast, were produced to correspond to modules termed the *monóchoron* and the *díchoron*, equal to 19.4 l and 38.8 l (Cockle 1981: 95–6), respectively.⁴ The use of foreign *amphorae* may thus have been advantageous in that it would have enabled the estate to bottle the wine that it produced in a wider range of volumes than would otherwise have been possible. The fact that the wine bottled in these containers was being subjected to a tasting, coupled with the fact that it was being discussed in connection with imported wines apparently intended for consumption by persons associated with the estate, suggests that it was meant for consumption within the estate. If so, this instance of the reuse of *amphorae* may be analogous to some extent to that posited in Section 5.3 for the Casa di Mestrius Maximus/Lupinar di Amarantus complex and the Casa del Vinario, at Pompeii, that is, the systematic reuse of wine containers for the bottling of wine that would be subject only to local transfers.

There are four distinct forms of archaeological evidence for the reuse of *amphorae* for the storage of irregular foodstuffs: preserved vessel contents, absorbed residues, *tituli picti*, and *graffiti*. The best-documented instance of the first of these four kinds of evidence comes from Meiron, a town located in the Galilee. Here, excavations carried out in a structure termed The Patrician House uncovered the remains of a storeroom (Room F) that contained a group of nineteen Late Roman 5s – wine containers of regional origin (Meyers et al. 1981: 60–68). These were found *in situ* on the room's earthen floor, sealed beneath rubble produced by the collapse of the building's upper story. Coin evidence indicates that this event occurred after A.D. 317, most likely during the A.D. 320s, and certainly not later than the town's abandonment, which probably occurred during the A.D. 360s. Fifteen of these containers were intact and held the carbonized remains of foodstuffs, whereas four had been broken in half in antiquity, with the bottom portion presumably used for the storage of some substance or substances no longer attested by any preserved remains. Analysis of the content of the fifteen whole *amphorae* revealed that six contained wheat, six Egyptian beans, one walnuts, and one barley (Meyers et al. 1981: 61). The excavators speculated that the four *amphora* bottoms might have been employed for the storage of olives or large food items, such as tubers or roots. The origin of this

deposit remains somewhat puzzling, although the excavators argue that the *amphorae* and their contents may have been חקדש [*hekdesh*], that is, objects dedicated to the Lord that were deliberately burned so that they could not be used (Meyers et al. 1981: 71–2). Because the *amphora* class to which these containers belong is of regional origin, the use of the intact vessels for the storage of foodstuffs may perhaps represent their initial use rather than their reuse. If the four *amphora* bottoms were, in fact, employed for storage, this presumably represents an instance of Type C reuse.

The Via Massarotti site at Cremona presents another instance in which preserved vessel content points to the reuse of *amphorae* as containers for irregular foodstuffs (Passi Pitcher 1998: 132). In this case, excavation uncovered a large deposit of *amphorae* that had been reused as bedding for a brick path constructed in the middle years of the first century. The vessels employed for this purpose consisted primarily of the Dressel 6As, Dressel 6Bs, and Lamboglia 2s, with a lesser presence of examples of various other classes, including the Dressel 2–4, the Dressel 7–11, and the Brindisi *amphora*. Many of these vessels contained preserved plant remains of an undetermined nature (presumably preserved due to having been carbonized), indicating that they were reused as bedding elements without first having been emptied of their content. One plausible scenario is that these containers were being used as storage jars at the time that Cremona was sacked by the forces of Otho in A.D. 69, damaged in a conflagration associated with this event, and then reused as bedding elements. Whatever the correct explanation, the fact that some of the vessels were of nonlocal origin indicates that their use as storage jars likely represented their reuse rather than their initial use.

The various techniques for the analysis of organic residues absorbed into the walls of ceramic vessels have considerable potential for aiding in the identification of *amphora* content and, from this, the study of *amphora* reuse (Biers and McGovern 1990; Heron and Evershed 1993). To date, the most interesting results of this kind have been obtained in a program of analysis involving a small number of containers from the mid-fifth century Schola Praeconum 1 deposit from the Palatine Hill (Rothschild-Boros 1981). In this instance, the application of thin layer chromatography to the analysis of residues absorbed into the wall of a Late Roman 3, a class generally considered to be a wine container, suggested that it had once held olive oil (Rothschild-Boros 1981: 83, 86). A different technique, high performance lipid chromatography, was applied to the analysis of two Late Roman 4s, likewise considered to be wine containers (Rothschild-Boros 1981: 86). In

this case, the results suggested that one of the two containers had once held olive oil and the other a substance perhaps to be identified as sesame oil.

As discussed in Section 5.5, the *tituli picti* on a small number of *amphorae* from the Vesuvian sites appear to be storage labels that indicate that the containers on which they appear were used for the storage of irregular foodstuffs. At Herculeum, the excavation of the Casa del Gran Portale (*Insula* 5, doorway 35) recovered three *amphorae* of unspecified class with an unspecified portion of their top removed, each of which bore a *titulus pictus* that indicated a content consisting of an irregular foodstuff (DeVos and DeVos 1982: 287). These included *cicer columbinum* [white chickpea] (*CIL* 4.10751), *halica apula* [Apulian farina] (*CIL* 4.10752), and *orissa* [rice] (*CIL* 4.10756). From Pompeii, there are two *amphorae* with *tituli picti* indicating a content of chickpeas (*CIL* 4.5728, 5729). Both were identified as Schöne 12s, a category that generally corresponds to the Dressel 2–4. Because this class is of local origin, it is possible that this represents the initial use of these containers rather than their reuse.

Elsewhere, the *tituli picti* on two *amphorae* from Egypt indicate a content consisting of an irregular foodstuff (Shelton 1991: 276; Bailey 1992). Both texts occur on examples of the Late Roman 4 – the container thought to correspond to the *gazition* – and are of probable sixth-century date. One of these texts indicates a content of pistachios (*Gr.P.* 532) and the other a substance that should perhaps be understood as dried fruit (*Gr.P.* 530).

Finally, a distinctive class of *graffiti* that appear on *amphorae* recovered at a number of sites in the northwestern provinces of the empire – clustered for the most part along the Rhine River frontier in Germania Superior and Germania Inferior – may indicate that the containers on which they occur were reused for the storage of foodstuffs (van der Werff 1989, 2003). The containers on which these texts appear, which have been recovered in contexts that range in date from the late first century to the first half of the third century, consist primarily of Dressel 20s, with a more limited representation of Gallic 4s. The texts consist of a *post-cocturam* [postfiring] *graffito* situated either on the vessel's rim, handle, or body. In the case of the Dressel 20s, these consist of either the number *VII* or the number *VIII*, or of one of these two numbers along with a second number in the range *II–XIV*, with the latter figure sometimes written adjacent to the former and sometimes on a different part of the vessel. In the case of the Gallic 4s, rather than *VII* or *VIII*, the first figure always consists of the number *III*. A comparison of the capacities of these two *amphora* classes with the values reported in these *graffiti* suggests that the first of the two figures refers

to *modii* (a unit of volumetric measure equal to one-third of an *amphora*, or 16 *sextarii*) and the second to *sextarii*, with the text recording either the capacity of the container or the amount of some substance that had been placed inside it. This inference is confirmed by a Dressel 20 from Bavay, in northern France, which bears the graffito *M VII S XII*. No examples of the Dressel 20 bearing *graffiti* of this kind have been recovered at sites in Gallia or Hispania, suggesting that these marks were produced in the northwestern provinces rather than at these containers' point of origin in southern Spain. Van der Werff, in seeking to account for these *graffiti*, has pointed out that the use of the *modius* is closely associated with the measurement of dry foodstuffs, such as grain, flour, and beans, and on the basis of this observation has argued that these texts were produced in the context of the reuse of the containers on which they appear for the storage of one or another of these (van der Werff 1989: 371–2).⁵ He has further speculated that in some cases the containers on which these *graffiti* appear represent *amphorae* that were reused for the purpose of transporting grain rations for troops from military storehouses to nearby army camps (van der Werff 2003: 115).

6.2.2 / Reuse as a Storage Jar for Nonfood Substances

It seems likely that *amphorae*, because of their ability to hold heavy loads, their resistance to holing by hard, sharp objects, and their impermeability, were regularly reused for the storage and also perhaps local transport of a variety of nonfood substances. This assumption is supported by a wide array of archaeological evidence.

Perhaps the most striking illustration of this practice comes from the Roman Mosaic Building at Constanza, mentioned in Section 5.5 (Rădulescu 1973: 194–8). Among the group of *amphorae* found in two of the eleven vaulted rooms (Rooms 3 and 4) that constitute the substructures of this building were several (at least 6) Late Roman 4s containing iron spikes, and ca. 120 Late Roman 2s, some of which held semiprocessed iron ore and iron anchors, and at least 28 of which contained a variety of organic substances, including resins (colophony, pine resin, mastic, storax, turpentine) and gum-resins (frankincense, myrrh). The context in which these *amphorae* were recovered, together with the array of items and substances found both inside them and along with them in these rooms (including anchors, weights, and iron minerals), suggests that they were reused as containers for marine stores (Bass and van Doorninck 1982: 164; Karagiorgou 2001: 138–9).⁶

Pompeii provides a considerable amount of evidence for the use of *amphorae* for the storage of construction materials. At the time of Mount

Vesuvius' eruption in A.D. 79 a substantial portion of the town's building stock was undergoing repairs to damage caused by the earthquake of A.D. 62 and the series of tremors that is believed to have occurred in its aftermath, and *amphorae* filled with materials apparently related to these activities – including both unmodified containers and containers with some portion of their top removed – have been recovered in a number of structures. The list of unmodified (or apparently unmodified) *amphorae* being used in this way includes two Dressel 2–4s filled with lime mortar that were found in the *atrium* of the Lupanar di Amarantus (Berry 1997b: 113), a container of unspecified class filled with lime that was found underneath a staircase in the Casa di M. Lucrezio Frotone (*Regio* 5, *Insula* 14a) (De Vos and De Vos 1982: 214), an *amphora* of unspecified class filled with lime that was found in the peristyle of the Casa della Nave Europa (Jashemski 1979: 235), and single *amphorae* of unspecified class containing “building repair materials” or “building material” that were found in Courtyard 44 at the Casa del Menandro (*Regio* 1, *Insula* 10, doorway 4), Area A at the Casa di Giulio Polibio (*Regio* 9, *Insula* 13, doorways 1–3), in Room 14 at the Casa dei Quadretti Teatrali (*Regio* 1, *Insula* 6, doorway 11), and in the garden at the Casa dell'Efebo (*Regio* 1, *Insula* 7, doorways 10–12) (Allison 2004: 150, 152). The list of vessels with some portion of their top removed that were employed for this purpose includes the following: two or more vessels of unspecified class containing either pulverized *cocciopesto* or plaster and lime that were found in the “procurator's quarters” in the Casa del Menandro (De Vos and De Vos 1982: 95; Jashemski 1993: 48), two or more containers of unspecified class containing “building material” that were found in Room 49, probably a sweat room, at this same residence (Allison 2004: 114), two containers of unspecified class containing lime and crushed lava that were found in the garden of the Casa del Medico (*Regio* 8, *Insula* 5, doorway 24) (Jashemski 1993: 217), several containers of unspecified class containing lime and other construction materials that were found in the Casa del Vinario (Sogliano 1888: 515), and several containers of unspecified class containing lime and other building material that were found in the garden of an unnamed house at *Regio* 9, *Insula* 9, doorway 4 (Jashemski 1993: 246).

Unmodified and modified *amphorae* were also sometimes utilized as containers for various industrial agents and related materials. At Pompeii, an *officina tinctoria* [dye-works] at *Regio* 9, *Insula* 9, doorway 4 yielded twenty-five *amphorae* of unspecified type that were being used to hold both yellow

and red dye (De Vos and De Vos 1982: 116). At Augst, *Insula* 31, a block given over in large measure to establishments involved in various kinds of metal working, produced at least twenty intact Dressel 20s (Martin-Kilcher 1987: 177). Two of these vessels, which were recovered next to a forge, contained hammer slag and small, rectangular iron plates, whereas the others may have served as basins for the quenching of newly forged items. At Meninx, a major center for the production of murex dye on the island of Jerba, fragments of Mau 35 *amphora* were found scattered throughout the middens of shell waste, and Wilson has suggested that these may belong to containers that were employed to carry this material from the workshops where it was generated to the middens for discard (Wilson 2002: 251).

Amphorae were also sometimes employed for the storage of coins.⁷ A good example of this practice is provided by the Cabrera 3 shipwreck, discussed in Section 5.2. In this instance, among the containers that belonged to the ship's cargo was a Dressel 23 that contained a group of 967 base metal coins (Bost et al. 1992: 22/4, 35, 114, 208–9, fig. III). These presumably represented a portion of the funds that had been brought along for the voyage either by the ship's master or by a merchant who had contracted to sail aboard it.

6.3 / Reuse as a Water Jar

It seems likely that unmodified wine *amphorae* and wine *amphorae* with their tops removed were regularly employed throughout the Roman world as water jars. This assumption is supported by a modest amount of representational and archaeological evidence. Although there are several passages in the corpus of Latin literature that refer to the use of vessels termed *amphorae*, *cadi*, and *lagoenae* as containers for water (Hilgers 1969: 100, 126, 203), in no case is it clear that these refer to *amphorae* rather than purpose-made water jars. *Tosephtha* Nezikin Abodah Zara 4.10, discussed in the preceding section, posits scenarios in which vessels termed *kankanim* that were initially employed for the storage of water are reused as containers for both wine and oil.

The representational evidence for this practice consists of two works of art that depict *amphorae* being employed as water jars. The first of these is a mosaic probably dating to the late fourth or fifth century from the annex of a basilica at Oued Ramel, near Zaghuan, in northern Tunisia, that is now housed in the Bardo Museum (Dunbabin 1978: 192). It depicts a scene of construction in three registers. In the central register, two men are shown preparing mortar (Figure 6.1). The man on the left pours what one must



FIGURE 6.1. Detail of mosaic from Oued Ramel depicting man using *amphora* as water container for mixing of mortar. Dunbabin 1978: fig 192

assume is meant to be water from what, though heavily restored, can be identified as small- to medium-sized fusiform *amphora* that he has perched on his shoulder into a pile of what is presumably meant to be lime, while the other is kneeling down mixing the two. The second such work is a silver cup from Castro Urdiales [Flaviobriga], in Spain, that bears both an inscription and relief decoration on its interior surface that relate to the *Salus Umeritana*, apparently a spa centered around a spring that provided water possessed of healing qualities. The relief decoration on this vessel is similar to that on the Hayes 53A bowl in African *Sigillata* C, suggesting a date in the second half of the fourth or the fifth century. One of the several clusters of figures depicted in the relief consists of a man emptying what one must assume to be spring water from a medium-sized fusiform *amphora*

into a large cask mounted on a wagon drawn by two mules, presumably for transport from the spring to some more or less distant location (Figure 6.2).

In the realm of archaeological evidence, either the context in which an *amphora* is found or the presence of physical modifications may suggest that the vessel in question was employed as a water jar. Evidence of this kind, however, tends to be problematic. In the case of context, although the fact that an *amphora* was recovered in a certain location may suggest that it was reused as a water container, it is generally impossible to demonstrate this with certainty. A good illustration of this problem comes in Pompeii, where the excavation of a lamp workshop at *Regio* I, *Insula* 20, doorways 2–3 produced an intact example of a Dressel 1 from a cesspit adjacent to a clay preparation basin (Cerulli Irelli 1979: figs. 27.4, 28.8). Cerulli Irelli thought that this vessel, which would have been at least many decades and perhaps a century or more old in A.D. 79, was most likely employed to transfer water from a cistern located in a different room to the clay preparation basin



FIGURE 6.2. Detail of silver cup from Castro Urdiales with relief decoration depicting man using *amphora* to transfer mineral water into wagon-mounted cask. Rostovtzeff 1957: pl. XXXV.2; by permission of Oxford University Press.

(Cerulli Irelli 1979: 55). Although this is an entirely plausible suggestion, there is no way to demonstrate that this vessel was not, for example, kept on hand for use in emptying waste from the cesspit. Similarly, it is sometimes assumed that *amphora* found inside wells represent vessels that were accidentally lost while being employed to draw water.⁸ As will be discussed in Section 10.2, however, disused wells were commonly employed for the discard of refuse, and the presence of *amphorae* in well deposits may thus have nothing to do with how the vessels in question were used. With regard to physical modification, the presence of one or more holes in the upper part of an *amphora* would have facilitated its filling, allowing air to escape as liquid entered via the vessel's mouth, or vice versa, and it seems plausible to suggest that in some instances modifications to *amphorae* of this kind were undertaken with a view to enhancing the facility with which they could have been employed as water jars. Although *amphorae* that have been modified in this way are occasional finds in different parts of the Roman world, as discussed in Section 5.1, for certain *amphora* classes it was a regular practice to make a hole in the area of the vessel's neck or shoulder to facilitate the removal of its prime-use content, and one cannot therefore assume that the presence of a hole in the upper part of an *amphora* constitutes proof that it was modified for reuse, either as a water jar or for some other purpose.

The excavations in the Agora at Athens have produced the most convincing archaeological evidence for the reuse of *amphorae* as water jars. This consists of a substantial number of complete or nearly complete small- to medium-sized *amphorae* – thus containers of a size suitable for this application – holed in their upper parts that were recovered in well deposits (Robinson 1959: 17). Among these vessels were at least six Late Roman 3s, including three examples from a deposit dated to the middle years of the fourth century (Robinson 1959: 108 nos. M 256–8), one from a deposit dated to the late fourth century (Robinson 1959: 110 no. M 279), one from a deposit dated to the early sixth century (Robinson 1959: 115 no. M 335), and one from a deposit dated to the late sixth century (Robinson 1959: 119 no. M 373). The other *amphorae* in question include three containers from a deposit dated to a period running from the late first to the mid second century, including a Forli *amphora* and a flat-bottomed container of unidentified provenience (Robinson 1959: 92–3 nos. M97, M96, M92) and a Keay 52 from a deposit dated to the early fourth century (Robinson 1959: 106 no. M234) (Figure 6.3). Published photographs of these vessels reveal that the holes in their



FIGURE 6.3. Keay 52 *amphora* from Agora at Athens with hole cut in shoulder, presumably to facilitate reuse as water jar. Robinson 1959: pl. 28; courtesy of the American School of Classical Studies in Athens.

shoulders generally have an oblate form and measure ca. 5–8 cm wide by 2–4 cm high. The technique employed to produce the holes is not clear, although it may have involved the use of a punch or similar instrument to break out a piece of the vessel's wall. It seems a plausible assumption that the reuse of these vessels involved tying a rope around one of their two handles so that they could be lowered down a well in a slanted position that would have resulted in their tipping and filling automatically upon reaching the level of the water. They were presumably lost and abandoned inside the well either because they struck the well's lining and broke, either while being lowered or while being raised back up, or because the strain to which the handle attachments were subjected when the filled vessel was raised caused the handle to separate from the rest of the container.

The so-called *Isis*, the wreck of a merchantman that sank in the area of the Skerki Bank, to the northwest of Sicily, during the late fourth century provides what may be additional evidence for the reuse of examples of the Keay 52 as water jars (Freed 1994: 35–7). Among the ten *amphorae* recovered from the wreck were two examples of this class with apertures cut in the

shoulder. The first of these had a round hole ca. 3 cm in diameter situated immediately below one of the handles. On the exterior surface in the area around the hole and partially covering it were the remains of a clay patch that bore the impression of a piece of cloth. This suggests that a piece of clay was placed over the hole in order to seal it and then held in place by a strip of cloth wound around the vessel's shoulder. The second container had an irregular hole measuring 1.2×2.3 cm on the upper part of the shoulder near the stump left where one of the two handles had broken away, perhaps prior to this modification. This hole was apparently produced by means of a punch or some similar implement. The ship's crew would have required containers of some sort for fresh water, and it seems reasonable to suggest that these two *amphorae* were water jars that had been modified to facilitate their filling.⁹

Distributional/quantitative evidence may constitute indirect evidence for the reuse of *amphorae* as water jars. By way of illustration, the pottery record for the city of Rome shows a decline in the local manufacture of closed forms such as jars and jugs that coincides more or less with the appearance of the various classes of small, flat-bottomed wine *amphorae* manufactured in Sicily and Italy, such as the Middle Roman 1, the Forlì *amphora*, and the Spello *amphora* (Peña 1999: 161). It seems reasonable to infer from this pattern that reused examples of these containers came to usurp the functions that had been carried out by these locally manufactured vessels, including, presumably, that of water jar.

6.4 / Reuse as a Urinal/Urine Container

It is widely assumed by scholars that the Romans used closed ceramic vessels of various kinds as urinals, with the urine collected in these turned over to fullers, who employed it as a solvent in various dyeing and laundering operations (Callender 1965: 30–34; Robinson 1993: 121–2; Adam 1994: 325; Wilson 2001: 275; van der Werff 2003: 111), and there is a modest amount of literary and archaeological evidence that *amphorae* were sometimes employed for this purpose.

In the realm of literary evidence, there are two passages that appear to refer to this practice. The first, from Varro (*Saturae menippeae* 192.104) states: *divitum amphoras Chias ad communem revocat matellam* [he/she retrieves the Chian *amphorae* of the wealthy for use as a common chamber pot]. The other, from Macrobius (*Saturnalia* 3.15.15) states: *dum eunt, nulla est in angiporto amphora, quam non impleant, quippe qui vesicam plenam vini habeant*



FIGURE 6.4. Dressel 2-4 *amphora* from Villa Regina, near Pompeii, with top removed and hole cut in wall, perhaps to facilitate reuse as urinal/urine container. Second example of same class with top removed set in opening at top. De Caro 1994: tav. 6A.

[as they went along the alley they failed to find an *amphora* that men with bladders full of wine might fill].

Turning to archaeological evidence, Pompeii has produced two modified *amphorae* that may be vessels adapted to serve as urinals/urine containers. The more fully documented of the two comes from the Villa Regina. In this case, a Dressel 2-4 with its top removed and with an aperture cut in its upper wall was found leaning against the wall in a corner of the villa's disused kitchen (De Caro 1994: 186-7 no. 176, 189 Figure 48.176, tav. 6.a.) (Figure 6.4). The top of the vessel had been sawn off just above the level of its shoulder. The aperture cut in the upper wall measured 8 cm wide x 10 cm high, with its upper edge ca. 5 cm below the line along which

the vessel's top had been sawn away, and would have stood between ca. 60 and 70 cm above the ground when the vessel was propped in an upright position. A second example of this same class, also sawn off at roughly the level of the shoulder and containing a white, powdery substance, probably lime, was found inserted in the vessel's mouth. De Caro, the excavator, not unreasonably suggested that the lower container had been modified to serve as a urinal.¹⁰ The second such container comes from the Casa del Fabbro (*Regio* 1, *Insula* 10, doorway 7). In this case, the excavation of the house's latrine uncovered an *amphora* of unspecified class with an unspecified portion of its top removed that contained traces of an unidentified organic substance (De Vos and DeVos 1982: 89). The inference that this vessel was employed as a urinal/urine container is strengthened somewhat by the fact that the house in which it was found lies next door to a *fullonica* [fulling establishment].

Elsewhere, the excavation of a building of uncertain nature, though perhaps a military storage facility, at Alphen aan den Rijn, in the Netherlands, may have produced evidence for the reuse of *amphorae* as urinals or urine containers (van der Werff 2003: 111). In this case, the building, dated to ca. A.D. 125, contained eight Dressel 20s that had either their tops or their bottoms removed. The compositional analysis of an incrustation on the wall of one of these vessels, found set into the building's floor, indicated that it contained calcium and phosphate. On the strength of this evidence van der Werff concluded that this container, and perhaps all eight, likely had been employed as urinals.

As noted in Section 5.1, examples of some classes of fish products' *amphorae* have fairly large apertures cut into their shoulders. Although it is possible that these containers were modified for reuse as urinals, it seems more likely that the apertures in question were made for the purpose of facilitating the removal of these containers' content.

6.5 / Reuse as a Basin

Logical considerations suggest that various *amphora* parts, including *amphora* bottoms (particularly from classes having a rounded, flat, or ring-footed base), *amphora* halves, and large *amphora* sherds, were regularly employed in a more or less casual manner as basins in connection with a variety of domestic, craft/industrial, and agricultural activities throughout the Roman world. This assumption receives support from a modest amount of literary, representational, and archaeological evidence.

In the area of literary evidence, *Mishnah* Tohoroth Kelim 4.1, concerned with the susceptibility of vessels to uncleanness under Jewish law, states:

חבית שנפחתה והיא מקבלת צל דפנותיה או שנחלקה כמין שתי צריבות רבי יהודה משהר
וחכמים משמאין

[If a *chabit* was broken but could still hold something in its sides, or if it was split, as it were, into two troughs, Rabbi Judah declares it insusceptible to uncleanness, but the Sages declare it susceptible (adapted from Danby 1933).]

From this passage one can infer that various legal scholars assumed that Jews might employ *amphora* halves and large *amphora* sherds in connection with the storage, preparation, or consumption of food.

In the realm of representational evidence, a fresco from the Tomb of Trebius Iustus, an early fourth-century structure on the Via Latina, outside Rome, may depict the use of an *amphora* half in connection with construction work (Figure 6.5). One of the figures in the scene is shown supporting an object on his shoulder as he climbs a ladder onto scaffolding where a mason is engaged in the construction of a wall in brick-faced concrete. Several scholars who have examined this scene have identified the object that the man is supporting on his shoulder as a trough of mortar. Although it is not clear what type of container the artist intended to depict, it is not implausible to suggest that it was meant to be an *amphora* half.¹¹

With regard to archaeological evidence, in some cases *amphora* parts have been recovered either still holding the remains of their content or bearing an incrustation on their interior surface that points to their use for an application of this kind. At Pompeii, excavation in the Casa degli Amanti (*Regio* 1, *Insula* 10, doorway 11) uncovered two *amphora* bottoms of unspecified class containing paint pigment in the space underneath a stairway (De Vos and De Vos 1982: 98). Also at Pompeii, the excavation of the house at *Regio* 5, *Insula* 3, doorway 4 produced an *amphora* half from an example of either a Dressel 26, Type 2020 *amphora*, or a Tripolitanian 1 that contained a white substance that Adam identified as lime (Adam 1994: 75 Figure 160) (Figure 6.6). This item was presumably being employed as a trough for the mixing of mortar or plaster in connection with a construction or decoration job, much as may be depicted in the fresco from the Tomb of Trebius Justus. Elsewhere, the excavations in the Domus Tiberiana section of the Palatine Hill recovered the bottom of an example of a Gallic 4 that had a layer of red



FIGURE 6.5. Detail of fresco from Tomb of Trebius Iustus on Via Latina, near Rome, depicting man carrying mortar in object perhaps to be identified as *amphora* half. Connolly and Dodge 1998: 139.

pigment covering its interior surface, indicating that it had been employed as a container for paint (Meylan Krause 2002: 125, 194 no. 414).¹²

In other cases *amphora* parts have been recovered in a context that suggests that they may have been employed for some application of this kind. By way of example, the excavation of the mid-second-century Grado shipwreck, discussed in Section 5.2, produced two *amphora* halves, one from an example of the Dressel 22, the other from an example of the Knidian *amphora* (Auriemma 2000: 38). These do not appear to relate to the *amphora* component of the ship's cargo, and one can only speculate as to why these items were kept aboard the vessel, conjecturing, for example, that they served for some activity such as the bailing of bilge water, the preparation and application of pitch, or the preparation of meals. Similarly, the excavation of the Lupanar di Amarantus, at Pompeii, described in Section 5.3, unearthed the remains of the lower part of an *amphora* of unspecified class in the room at the southwest corner of the *atrium* that also contained the skeletons of a mule and a dog (Berry 1997b: 113). The association of this *amphora* part with the remains of these two animals raises the possibility that it served as a basin for their food and/or water.

6.6 / *Reuse as a Beaker or Bowl*

The pottery assemblages from the Mons Claudianus and Mons Porphyrites quarries in the Eastern Desert of Egypt indicate that these were the locus of an apparently unique craft tradition that involved the reworking of used pots – for the most part examples of the Egyptian Biconical (Nile Silt) *amphora* – to produce tableware vessels, for the most part beakers and bowls (Tomber 2006: 182). Tomber, who published the pottery assemblage from the Wadi Umm Hussein site that served as the residential and administrative center for the Mons Claudianus quarry complex,¹³ suggests that this practice was a response to the costs and difficulties involved in the supply of pottery to this remote outpost of the Roman world, perhaps abetted by the dearth of free-time diversions available to the quarry workers and these individuals' adeptness with the chisel (Tomber 2006: 182). Whatever the explanation, it is clear from evidence described in other sections of this chapter and in



FIGURE 6.6. *Amphora* half from Dressel 26 *amphora* Type 2020 *amphora*, or Tripolitanian 1 *amphora* from house at Regio 5, Insula 3, doorway 4 at Pompeii reused as container for mixing lime. Adam 1994: 75 fig. 160.

Chapter 7 that Wadi Umm Hussein was the locus of an unusually intensive and inventive tradition of Type C pottery reuse.

The evidence from the Wadi Umm Hussein site indicates that there the tradition of reworking *amphorae* and other vessels into beakers and bowls endured for most of the second and the earlier part of the third century (Tomber 2006: 181–92). It generally involved the reworking of the lower portion of an *amphora* – including the cutting down of the wall and the removal of the spike – by means of a chisel to attain a vessel of the desired size and shape. In many cases this was then embellished with more or less elaborate incised or excised decoration, in some instances including an inscription, and then surfaced with a smooth black coating perhaps consisting of pine pitch or bitumen. Tomber's catalogue of the pottery from Wadi Umm Hussein includes thirty-seven relatively tall, thin vessels of this kind that she classifies as beakers, twenty-two somewhat broader and shallower vessels that she classifies as bowls, and one vessel of indeterminate size and shape.

6.7 / *Reuse as an Incense Burner*

The excavations at Wadi Umm Hussein recovered two reworked spikes from examples of the Egyptian Biconical *amphora* that retained a black residue on their interior surface that may be the result of the use of these items as incense burners (Tomber 2006: 295 nos. 34–5, 296 figs. 4.5.34–5).¹⁴

6.8 / *Reuse as a Grinding Palette*

The excavations at Wadi Umm Hussein recovered spikes from two examples of the Egyptian Biconical *amphora* with a concave depression on one side that might have been produced by their use as grinding palettes (Tomber 2006: 297 nos. 48–9, 298 fig. 4.6.48).

6.9 / *Reuse as a Strainer*

Logical considerations suggest that *amphorae*, *amphorae* with their tops removed, and *amphora* bottoms with one or more holes cut into their lower area may have been employed as strainers.¹⁵ Tel El Ifshar, near Caesarea, in Israel, provides a possible example of this practice. Here, excavation recovered a Late Roman γ that was complete except for its short collar rim/neck and a small area at the center of its broad, rounded base in a refuse deposit dated to the fifth or sixth century (Lalock, n.d., 19/21 no. TI 90.5, 22 fig. 5). Around the edge of the roughly circular break produced by the detaching of the piece at the center of the vessel's base was a ring of six holes, apparently produced by drilling. The weak point produced by the

drilling of the holes coupled with the use of the vessel subsequent to this modification presumably resulted in the loss of the area at the center of the base. The most logical explanation for this modification is that it was undertaken with a view to adapting the vessel for use as a strainer. One can speculate that some substance that required washing was placed inside the vessel and water then poured in at the vessel's mouth, with this trickling down and exiting through the ring of holes around its bottom.

6.10 / *Reuse as a Boundary Marker*

Two passages from the Latin agronomists indicate that *amphorae* and *amphora* parts were sometimes employed as boundary markers. The first of these, *De condicionibus agrorum* 108.6–7, states: *nam in quibusdam regionibus iubemur vertex amphorarum defixos inversos observare pro terminis*. [Moreover in some regions we are instructed to recognize as boundary markers the upper portions of *amphorae* set into the ground in inverted position.] On the basis of this it is possible to infer that *amphora* tops were employed as boundary markers in some parts of the Roman world. The second passage, *Ex libris latini de terminibus*, 230.10–11, states that *laguinas tres quadrifinium faciunt*. [Three *lagonae* constitute a *quadrifinium* (i.e., a place where four parcels of land meet).]¹⁶ In this case one can infer that small *amphorae* were sometimes employed as boundary markers.

Worth noting in this connection is the fact that two other passages from the Latin agronomists refer to the placing of sherds of unspecified type underneath boundary markers in a ritual connection. The first of these is *De condicionibus agrorum* p. 106.24–27, which states: *nunc, quoniam volutarium est, aliquibus terminis nihil subditum est, aliquibus vero aut cin<er>es aut carbones aut testea aut vitrea fracta aut asses subiectos aut calce<m> aut gypsum invenimus*. [As it is, because it is a voluntary practice, nothing at all is placed under some stones, whereas under others we find ashes, or charcoal, or broken pottery or glass, or small coins thrown down, or limestone, or gypsum.] The other, *Expositio limitum vel terminorum*, p. 260.19–20, states: *aut calcem, aut gypsum, aut carbones, aut vitria fracta, aut cineres, aut testam tusam, aut decanummos, aut pentanummos*. [We find limestone, or gypsum, or carbon, or broken glass, or ashes, or crushed pottery, or ten-*nummus* and five-*nummus* coins.]

6.11 / *Reuse as a Libation Conduit*

Modified *amphorae* and *amphora* parts, including *amphorae* with their bottoms pierced by holes, *amphorae* with their bottoms detached, and *amphora* tops, were sometimes installed on tombs to serve as conduits for the pouring of



FIGURE 6.7. Forlì *amphora* with hole in bottom employed as libation conduit at Porto Recanati necropolis. Mercado 1974: 186 fig. 54.

libations in connection with observances in honor of the dead (Toynbee 1971: 51–2). This practice is attested at necropoleis at four settlements in central Italy in connection with tombs dating to the first to third century, including Ostia/Portus (Calza and Nash 1959: 113–14, fig. 156; Baldassare 2001: 389), Rome (Steinby 1987: 93, Tafel 12b), Sarsina [Sassina] (Ortalli 1987: 179–80), and Porto Recanati (Mercado 1974: 420–22), with *amphorae* belonging to several different classes employed for this purpose. It seems likely that a systematic survey of the literature would show that this practice was considerably more widespread than is suggested by this list.

Brief descriptions of the specific arrangements employed at two of the four necropoleis just named will suffice to provide some idea of the variability involved in this practice. The first of these is the necropolis at Porto Recanati, near Ancona, on the Adriatic coast of Italy. Here, excavations uncovered 385 burials, including both inhumations and cremations that dated for the most part to the first and second centuries (Mercado 1974). Many of the tombs were provided with one, two, or three libation conduits consisting either of an *amphora* with its bottom pierced by a hole, an *amphora* with its bottom removed, or an *amphora* top. These were set upright, usually in an inverted position, at one or both of the short ends of the tomb. Tomb 18, for example, a cremation burial of the “*alla cappuccina*” type dated by a coin

to A.D. 97 or later, had a Forlì *amphora* with its bottom pierced by a hole set in an inverted position at one of its short ends (Mercando 1974: 185–9). (Figure 6.7). This element rose to roughly the same height as the tomb's tile covering structure, suggesting that it projected above the ground surface by no more than a few centimeters. Tomb 128bis, a cremation burial dating to the late first or second century, was provided with a conduit consisting of the top of a Pseudo-Koan *amphora* that had been detached ca. 15 cm below the shoulder (Mercando 1974: 294–7) (Figure 6.8). This was set in inverted position, with the vessel's rim nestled inside a shallow plate pierced by ca. 20 holes that served as the cover for the cookware casserole employed as the ossuary.



FIGURE 6.8. Top of Pseudo-Koan *amphora* reused as libation conduit at Porto Recanati necropolis. Mercando 1974: 297 fig. 207.

The second necropolis to be considered is that at Isola Sacra, the island situated at the mouth of the Tiber River, between Ostia and Portus (Pavolini 1983: 260–70; Baldassare 1987; 2001). Here, excavations have uncovered nearly 600 open-field tombs, including both inhumations and cremations, dating from the late first to the early third century. Many of these were provided with a libation conduit that consisted of an *amphora* that had had its bottom removed (Pavolini 1986: 253; Baldassare 2001: 389). From published photographs of the site it is evident that for inhumations this involved placing an *amphora* that had been modified in this way right side up at one of the short ends of the tomb (Figure 6.9). In the case of cremation burials, the vessel was presumably positioned directly above the ossuary. The vessels employed for this purpose included Beltrán 1s, Beltrán 4As, and cylindrical containers of Tunisian origin, most likely African 1s and/or African 2s. While it is difficult to determine from the published photographs the position of the ground level at the time that these tombs were constructed, it appears that a substantial portion of these vessels, perhaps often ca. 50 cm or more, projected above the surface (Toynbee 1971: figs. 18–19; Peacock and Williams 1986: 126 fig. 56; Pavolini 1986: 249 fig. 107).

6.12 / *Reuse as a Funnel*

It seems likely that *amphora* tops detached at the level of the upper wall or shoulder and with the handles removed and/or *amphora* bottoms (from classes that terminated in something other than a solid spike) with holes drilled or punched through their bases were regularly employed as funnels. Although examples of both kinds of items are regularly recovered in archaeological contexts compatible with their use as funnels, it remains impossible to demonstrate that they were, in fact, employed for this purpose. Examples of *amphora* tops that might have been used as funnels include an *amphora* neck from the Casa di Epidio Primo at Pompeii (*Regio* 1, *Insula* 8, doorway 14) (Berry 1997a: 192) and the “inscribed top of a red-painted amphora” recovered in a shop at Kourion (Soren and James 1988: 141). Also worth noting in this connection is the passage from Martial’s *Epigrammata* (12.32), noted in Section 4.1.1, that refers to an *amphorae cervix* among the belongings of a destitute man. Examples of *amphora* bottoms that might have been employed as funnels include eight items consisting of the lower portion of an Egyptian Biconical *amphora* with a hole in the base recovered at Wadi Umm Hussein in contexts dating to the second century (Tomber 2006: 188–90 nos. 1075–82, 189 figures 1.72.4–1075-4–1082).



FIGURE 6.9. *Amphorae* with bottoms removed reused as libation conduits at Isola Sacra necropolis. Toynebee 1971: pl. 19.

6.13 / *Reuse as a Brazier or Hearth*

Scattered archaeological evidence indicates that modified *amphorae* and *amphora* parts were sometimes employed as braziers or hearths. The best evidence for the first of these applications comes from Pompeii, where the excavation of the vineyard that occupied the northwest portion of *Regio* 3, *Insula* 7 uncovered an *amphora* top of unspecified class set in inverted position near the south enclosure wall that surrounded the premises (Jashemski 1979: 232; 1993: 105). The piece, which from a published photograph appears to have been detached at the level of the shoulder, contained a layer of ashes 6 cm deep, on top of which sat a sooted pot. From this evidence it is clear that the piece in question was being reused as a brazier. It was situated a short distance from a pile of potsherds, raising the possibility that it was retrieved from provisional discard in order to be employed for this purpose.¹⁷ Also at Pompeii, Sogliano noted that excavations in the garden of the Casa della Nave Europa complex, discussed in Section 5.3, uncovered an *amphora* of unspecified class with its top cut off that had been adapted for use as a brazier (Sogliano 1889: 125). He did not, however, indicate the nature of the evidence that led him

to this interpretation. At Wadi Umm Hussein, a hearth installed in a latrine is described as consisting of “the lower part of a large *amphora* . . . within a circuit of *amphora* spikes, mortared together” (Maxfield and Peacock 2001: 463–4). Elsewhere, Callender noted an instance of an *amphora* being used as a hearth at Milecastle 79 on Hadrian’s Wall, stating that signs of burning on the vessel indicated that it had been employed for this purpose (Callender 1965: 34, pl. VIIb). Although the published photograph of this fixture is extremely difficult to interpret, it may consist of an *amphora* half from a Dressel 20 immured in a horizontal position in a bench or platform of some kind.

6.14 / *Reuse as a Lamp Cover*

The excavations at Wadi Umm Hussein recovered an item consisting of the central portion of an Egyptian Biconical *amphora* with at least two subround holes ca. 3–4 cm in diameter cut in the wall that may have functioned as a lamp cover (Tomber 2006: 299 no. 53 fig. 4.7.53).

6.15 / *Reuse as a Prop or Support*

Logical considerations suggest that various *amphora* parts, including *amphora* tops, *amphora* bottoms (from classes with a rounded, flat, or ring-footed base), *amphora* spikes, *amphora* halves, and large *amphora* sherds, were regularly employed in a more or less casual fashion as props or supports in connection with various activities. This assumption is supported by a small amount of archaeological evidence.

Berry, in discussing cooking equipment at Pompeii, states that *amphora* spikes were employed as props for cooking vessels (Berry 1998: 58) and publishes a photograph of assorted kitchen items from the Casa di Cerere (*Regio* 1, *Insula* 9, doorway 5) that includes three spikes, all apparently from Dressel 2–4s (Figure 6.10). These were presumably set in a triangular arrangement among the embers on top of a masonry hearth, and a cooking vessel then placed on top. An arrangement of this kind was, in fact, recovered in the excavation of the Villa Regina, outside Pompeii. In this instance, two *amphora* spikes and a fragment of stone were found set in a triangular arrangement among the layer of ashes on top of the masonry hearth in the villa’s disused kitchen (De Caro 1994: 49). Elsewhere, Allison, in her survey of the portable material culture recovered in a sampling of thirty *atrium* houses at Pompeii, documented four instances of what she terms “*amphora* bottoms” that may have been employed to support cooking vessels, including the Casa di Giulio Polibio, the house at the Casa del Sacello Iliaco, (*Regio*



FIGURE 6.10. Three *amphora* spikes from Casa di Cerere at Pompeii perhaps reused as props for cooking vessels. Berry 1998: 58 fig. 68; courtesy Ministero per i Beni e le Attività Culturali.

1, *Insula* 6, doorway 4), and the Casa di Marcus Lucretius Fronto (*Regio* 5, *Insula* 4, doorway 1) (Allison 2004: 101 table 5.14b).

The excavation of the Villa Regina also produced evidence for the use of *amphora* tops as supports. In this case, excavation in the south corner of the villa's *torcularium* [press room] uncovered two *amphora* tops and two chunks of lava positioned on the floor in a rectangular arrangement (De Caro 1994: 37, 186). The two *amphora* tops, which stood 22–23 cm high, included the top of a Dressel 2–4 sawed off at the level of the shoulder that was missing both its rim and the upper attachment of one of its handles (De Caro 1994: 185 fig. 47.173, 186 no. 173) and the top of a container of Tunisian or Tripolitanian origin sawed off at the level of the upper wall (De Caro 1994: 185 fig. 47.178, 187 no. 178). The rectangular arrangement of the four items led De Caro to infer that at the time of the villa's destruction they were being employed as supports for a tabletop in some sort of perishable material, most likely wood.

It seems likely that unmodified sherds of all kinds, as fairly durable objects that lay close to hand in considerable quantities in many places, were regularly employed in an adventitious manner as plates, supports, and similar items. A scattering of literary sources supports this assumption. Ovid (*Fasti* 2.535–9), for example, refers to the use of a potsherd as a plate for a sacrificial offering: *parva petunt manes, pietas pro divite grata est munere: non avidos Styx habet ima deos. tegula porrectis satis est velata coronis et sparsae fruges parcaque mica salis inque mero mollita Ceres violaeque solutae: haec habeat media testa relicta via.* [The underworld is not home to gods who are greedy, and the spirits of the dead ask for but little – they prefer piety to some costly gift. For this is enough: a roof tile draped with garlands, or a few scattered grains of wheat and a pinch of salt, or perhaps a bit of bread soaked in wine together with some violets, placed on a potsherd and left in the middle of the road.] Varro (*De re rustica* 3.16.27), in turn, recommends the use of sherds as perches for bees: *in qua aqua iaceant testae aut lapilli, ita ut extent paulum, ubi adsidere et bibere possint* [sherds and small stones should lie in this water in such a way that they emerge from it by a small mount, on which they (i.e., bees) might rest and drink].

6.16 / Reuse as a Polishing or Grinding Implement

There is a modest amount of archaeological evidence indicating that *amphora* parts, specifically spikes and handles, were sometimes employed as grinding or polishing implements. Laubenheimer states that in Gaul fragments of handles and spikes from Dressel 1s were employed as polishers, publishing a photograph of a selection of fairly small handle and spike fragments in worn condition from the Allées de Tourney site at Bordeaux that she indicates were employed for this purpose (Laubenheimer 1990: 55) (Figure 6.11). Similarly, Martin-Kilcher states that handles from Dressel 20s recovered in the excavations at Augst and Kaiseraugst showed wear indicating that they had been utilized as grinders (Martin-Kilcher 1987: 177), whereas Green publishes a fragment of an *amphora* handle, probably from a Dressel 2–4, from the Billingsgate Buildings site in London that shows wear suggesting that it was employed for a grinding or polishing operation of some kind (Green 1980: 86, no. 422, 87 fig. 49.424. [sic]). Also worth noting in this connection is a small (ca. 14 cm long by 7 cm wide) scoop with a subrectangular blade and a handle fashioned from a sherd of an Egyptian Biconical *amphora* that was recovered in the excavations at Wadi Umm Hussein (Tomber 2006: 299 no. 52 fig. 4.7.52).



FIGURE 6.11. Fragments of handles and spikes from Dressel 1 *amphorae* from Allées de Tourney site at Bordeaux showing wear suggesting reuse as polishers. Laubenheimer 1990: 55.

Columella (*De re rustica* 7.5.8), in a passage regarding a remedy for scabbing on sheep, provides evidence for the use of sherds for practices of this kind: *quae tamen prius aspera testa defricta vel pumice redulceratur* [after it has previously been rendered sore by being rubbed with a rough sherd or a piece of pumice].

6.17 / Reuse as an Amphora Stopper or Removable Lid Stopper

There is a considerable amount of archaeological evidence that *amphora* sherds reworked into a disk shape were regularly employed as *amphora* stoppers.¹⁸ This involved setting the reworked sherd into the mouth of the container and then covering it with lime plaster, gypsum, clay, or some other substance that would then set, sealing the opening and holding the stopper in place. Stoppers manufactured in this way were perhaps known in Latin as *obturamenta* (singular: *obturamentum*).¹⁹ Unreworked *amphora* body sherds were also on some occasions employed for this purpose, and it seems possible that reworked *amphora* spikes were sometimes employed either as *amphora* stoppers or as removable lid stoppers for opened *amphorae* and/or closed vessels belonging to the other functional categories.

Disks fashioned from sherds of pottery, for the most part *amphora* sherds (or, much less often, fragments of brick and tile), occur in abundance at many Roman sites, and there have been several efforts to characterize variability in the size of these objects, the techniques employed for their fabrication, and the pottery classes from which they were made, as well as to determine the function or functions for which they were employed (Bass and van Doorninck 1982: 160–61; Fulford and Peacock 1984: 251–2, 265–72; Chinelli 1994: 480–90; Peña 1998: 98–100; Tomber 2006: 300). Sherd disks have now been documented at a number of shipwreck sites, in many cases *in situ* in the mouths of *amphorae*,²⁰ and it cannot be doubted that objects of this kind were regularly utilized for the stoppering of several classes of containers (Bass and van Doorninck 1982: 160–61; Bonifay 2004: 467). This inference is corroborated by evidence from Quseir al-Qadim, where excavations have recovered several sherd disks bearing traces of a plaster covering on their surface and plaster *amphora* stoppers that appear to have been made by being poured over a sherd disk (Peacock, Blue, Bradford, and Moser n.d.).

The mid-second-century Grado wreck, discussed in Section 5.2, furnishes the most detailed and informative evidence regarding the use of sherd disks as *amphora* stoppers. In this case, the ca. 200-plus African 1s, 20-plus Tripolitanian 1s, and ca. 150-plus Knossos 19s recovered from the wreck were found to be stoppered with disks fashioned from sherds deriving from containers belonging to the same *amphora* class (Auriemma 2000: 31, 45). Analysis of the content of a subset of these containers suggested that all were being reused for the packaging of fish preserves. As noted in Section 5.3, the evidence from the wreck suggests that one or more fish products packaging facilities located somewhere near the head of the Adriatic Sea systematically collected used examples of these classes for refilling with fish preserves, presumably employing sherds from containers that broke while in storage or were otherwise unusable for the manufacture of the stoppers required for this operation.

The Palatine East excavations recovered ca. 900 sherd disks in Roman-period contexts, and this unusually large group of examples sheds considerable light on the use of these items at Rome (Figure 6.12). Although sherd disks occur in very small numbers from the beginning of the site sequence near the middle of first century, they begin to appear in significant quantity only during the last decade of the third century. From this point until the end of the Roman-period sequence in the second half of the fifth century they occur in notable abundance. The only detailed study of these

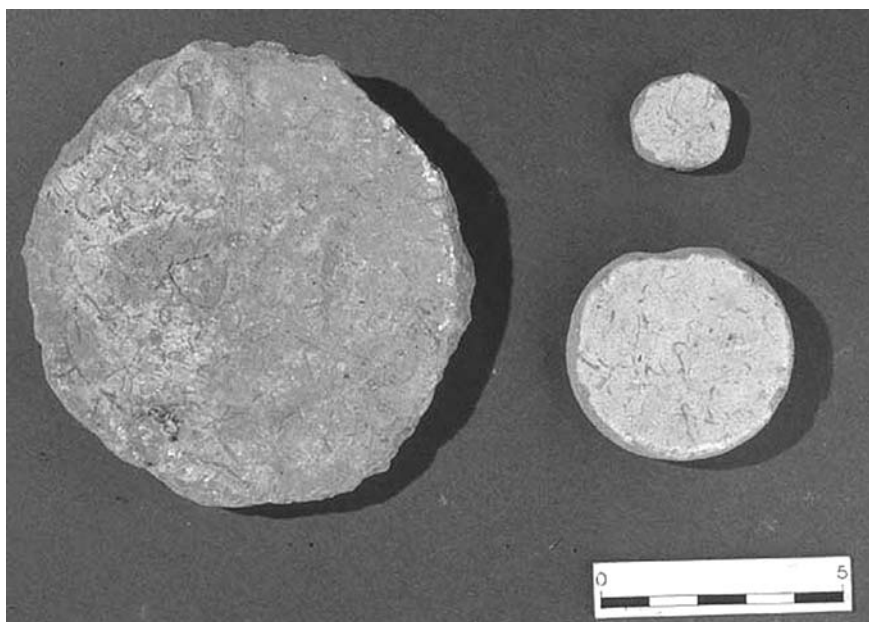


FIGURE 6.12. Three disks fashioned from *amphora* sherds from Palatine East site at Rome. Photo: JTP.

items undertaken to date involved a group of 224 examples recovered in Context A (105), a dump of ca. 500 kg of pottery deposited during the first decade of the fourth century (Peña 1998: 98–100). This revealed that the examples in this context varied in diameter from 1.7 to 9.0 cm, with all but eleven examples (4.9%) falling in the range from 1.9 to 5.8 cm.²¹ A total of 203 (90.6%) of these items were produced from *amphora* sherds, whereas 15 (6.8%) were produced from tableware or utilitarian ware sherds, and just 6 (2.6%) from cookware sherds. Most examples showed irregular edges, indicating that they had been manufactured by means of chipping, although a small number displayed smoothed edges, raising the possibility that they were shaped, or at the very least finished, by means of abrasion.²² The largest subgroup, comprising ninety-three examples (41.5%), was produced from sherds deriving from *amphorae* of Tunisian origin. Another twelve (5.4%) were produced from sherds deriving from tableware or cookware vessels of Tunisian origin.

These data suggest that a substantial percentage of the sherd disks in Context A (105) may have reached Rome as stoppers in the Tunisian *amphorae*

that constitute the most conspicuous element of the Palatine East pottery assemblage during the late third and early fourth century. One should, however, hold open the possibility that certain of these items were manufactured for some other purpose or purposes. Compatible with this assumption is the fact that seven (3.1%) of the disks in the group were manufactured from sherds deriving from tableware or cookware vessels originating in west central Italy. Although these disks might have been employed for the stoppering of certain classes of *amphorae* of probably west central Italian origin, there seems to be a reasonable possibility that they were manufactured at Rome for some other purpose.

These data may be compared with those compiled by Fulford for the sherd disks recovered in the excavations at the Avenue du President Habib Bourguiba site at Carthage (Fulford and Peacock 1984: 252). Here, 369 sherd disks were recovered from contexts dating from the late fourth to the first half of the seventh century.²³ These ranged in diameter from 1.3 to 16.0 cm, with 62 (16.8%) examples falling outside the size range of 1.9 to 5.8 cm. A total of 168 disks (45.5%) were produced from certain or possible *amphora* sherds, 63 (17.0%) from certain or possible sherds of African *Sigillata*, and 134 (36.4%) from sherds of coarse pottery, a category roughly corresponding to the cookware and utilitarian ware functional categories. Of the disks fabricated from *amphora* sherds, 42 (11.4%) were manufactured from sherds deriving from containers of Tunisian origin, whereas 21 (5.7%) were made from sherds of *amphorae* either belonging to some other class or for which no class identification could be made.

Certain differences can be noted between this group of sherd disks and the group from Context A (105) at the Palatine East. With respect to size, there is a somewhat wider range of diameters, as might be expected from a larger group of items. A substantially higher percentage of the disks falls outside the range 1.9 to 5.8 cm, with the bulk of these (49, or 13.3%) beyond the upper limit. With regard to functional class, there are strikingly higher percentages of disks fabricated from tableware and cookware/utilitarian ware sherds, with a correspondingly lower percentage fabricated from *amphora* sherds. Within this last group, a substantially larger proportion was fabricated from sherds deriving from containers of Tunisian origin.

It is not entirely clear how one should account for the differences between these two groups of sherd disks. On the one hand, the disks in the Carthage group were likely produced over a substantially broader span of time, and some portion of the differences between the two groups should perhaps

be attributed to this fact. At the same time, the larger proportion of disks produced from sherds belonging to functional categories other than *amphorae* and the higher proportion of disks in the 5.8-plus-cm size range may point to a more substantial representation of disks manufactured for a purpose or purposes other than the stoppering of *amphorae*. It could be argued, however, that some set of characteristics made sherds deriving from *amphorae* of Tunisian origin particularly well suited for the manufacture of sherd disks, and that these same characteristics also made sherds deriving from certain utilitarian ware forms of Tunisian origin well suited for this purpose. Because the latter were present only in very small numbers at Rome, the systematic selection of sherds of Tunisian origin for the manufacture of disks would have resulted in an assemblage of sherd disks characterized by a higher proportion of disks fashioned from Tunisian *amphorae*, and from *amphorae* more generally. Even so, the substantially higher percentage in the Carthage group of disks manufactured from sherds of tableware, specifically African *Sigillata*, points toward the possibility that some functional consideration may lie behind at least a portion of the differences between the two groups.²⁴

The excavations at Quseir al-Qadim have recovered several *amphora* stoppers that were produced by jamming unworked *amphora* and/or coarseware sherds into the mouth of a container and then pouring plaster over the top (Peacock, Blue, Bradford, and Moser n.d.). In some cases these preserve string or string impressions crossing over their undersides, and it appears that lengths of string were sometimes set into the mouth of a vessel and allowed to dangle over the side prior to the insertion of the sherds with a view to facilitating the extraction of the stopper.

Reworked *amphora* spikes may also have been employed for the stoppering of *amphorae* and/or as removable lid stoppers either for opened *amphorae* or for closed vessels belonging to one or more of the other functional categories. The excavations at Wadi Umm Hussein recovered forty-seven reworked spikes from examples of the Egyptian Biconical *amphora* in contexts dating to the second century that were likely used as stoppers (Tomber 2006: 291–3). These items, apparently produced by chipping by means of a chisel, belonged to four distinct variants – headless stoppers, long headless stoppers, stoppers with a small, well-defined head, and stoppers with a broad head. In Tomber's view, the small size of these items suggests that they were most likely employed as removable lid stoppers for tableware or utilitarian ware vessels rather than as stoppers or lid stoppers for *amphorae*. Three were pierced by a hole running from the top of their head to the side of their shaft, and it

seems likely that a string was passed through this and knotted, functioning as a handle. Chinelli, in her discussion of the group of sherd disks recovered in the excavations at Aquileia, notes that *amphora* bases (presumably meaning spikes) were also sometimes modified to serve for the stoppering of *amphorae*, with these items characterized by a regular cut at the point where the wall and the base meet (Chinelli 1994: 481). She publishes two examples from Aquileia, and cites examples from three other sites in peninsular Italy – Ventimiglia [Albintimilium], Monte Barro, and Calvatone [Bedriacum] – as well as from Porto Torres [Turris Libisonis], in Sardinia (Chinelli 1994: 480, n. 398). Chinelli does not state the basis for her functional interpretation of these items. Finally, a context at Ostrakine, in the north Sinai, dating to shortly after A.D. 668, contained ca. 230 spikes cut from *amphorae* of Tunisian origin, perhaps for the most part residual containers, and Arthur and Owen have suggested that these may have been deliberately detached to serve as stoppers (Arthur and Oren 1998: 205).

Amphora spikes were also sometimes employed as stoppers for flue holes in ovens. At the Villa Regina, for example, an *amphora* spike was found inserted into a hole in the south wall of the masonry bread oven located in the kitchen (De Caro 1994: 49). Similarly, at Wadi Umm Hussein, an *amphora* spike was found inserted into the flue pipe of a bread oven (Maxfield 2001: 66, 82 figs. 14.a–b).

6.18 / *Reuse as a Token or Gaming Piece*

It seems likely that both modified and unmodified *amphora* sherds, including sherd disks, were regularly employed as tokens and/or gaming pieces. Although there is no direct evidence to this effect with regard to sherd disks, those at the smaller end of the size range attested for these items (e.g., with diameters of less than 3 cm) were likely too small to have been employed as *amphora* stoppers, and were presumably manufactured for some other purpose. Fulford, in his study of the group of sherd disks recovered at the Avenue du President Habib Bourguiba site at Carthage, suggested, not unreasonably, that these items may have functioned as counters or tally pieces (Fulford and Peacock 1984: 252).²⁵

Elsewhere, the excavations at Wadi Umm Hussein recovered 29 spikes from examples of the Egyptian Biconical *amphora* that had been squared off on their sides and that may have functioned as gaming pieces or weights (Tomber 2006: 297 nos. 46–7, 298 figs. 4.6.46–7). Also recovered was a spike from an example of this class that had been carved into a crude figurine

and that may have served as a gaming piece (Tomber 2006: 295 no. 38, 298 fig. 4.6.38).

Pollux (*Onomasticon* 9.III), a rhetorician of the late second century, describes a game called ὀστρακίνδα (*ostracínda*), the playing of which involved the tossing of an object termed an *ostrakon* that might have been either an oyster shell or a sherd.²⁶ If the object fell dark side up one team of players was the pursuers and the other the pursued, whereas if it fell light side up these roles were reversed. Although the importance of the dark-side/light-side distinction may suggest that the object in question was more likely an oyster shell than a sherd, the interior and exterior surfaces of sherds belonging to many classes (e.g., the various classes of Tunisian *amphorae*) present a strong contrast, and might have proved suitable for this purpose.

6.19 / Reuse as a Weight

Sherd disks pierced through their middles, in some cases fabricated from *amphora* sherds, are occasional finds at many Roman sites. These items presumably were strung on a cord, leather thong, or something similar, and likely served as weights of some sort. Functions that might have been served by a small weight of this kind include spindle whorl and line/net sinker.

The most extensively documented group of pierced sherd disks comes from the Avenue du President Habib Bourguiba site, at Carthage (Fulford and Peacock 1984: 251, 265). Sixteen items of this kind were recovered in contexts dating from the fifth to the seventh century. Also recovered were one sherd disk that had a partially completed perforation and one that may have had a partially completed perforation (Fulford and Peacock 1984: 267 no. 7335, 265, no. 7363). These items ranged in diameter from 1.8 to ca. 8.0 cm, with the diameter of their perforations ranging from 0.3 to 1.0 cm. The perforations were presumably made by drilling.²⁷ Four (22.2%) of the items were manufactured from sherds deriving from an *amphora* of Tunisian origin, five (27.8%) from a sherd deriving from an African *Sigillata* vessel, one (5.6%) from sherds of fine-bodied pottery, perhaps deriving from a Black Gloss Ware vessel, and eight (44.4%) from sherds deriving from a coarse pottery vessel. The weights of these items are not reported.

Given the small size of this group of items, it is unclear whether any significance should be attributed to differences between it and the group of 369 unperforated sherd disks from this site discussed in Section 6.17 with regard to the percentage of each manufactured from sherds deriving from

vessels belonging to the various functional categories. Striking, however, is the fact that nearly 63% (eleven) of the perforated sherd disks were broken, in comparison with only 7% (twenty-six) of the unperforated sherd disks. Fulford, when considering the likely function of these items, pointed out that the preponderance of perforations in the 0.5-cm and smaller range suggests that they may have served some function other than that of loom-weight, as the central holes of Roman-period loom-weights from Britain tend to be substantially larger than this (Fulford and Peacock 1984: 251).

6.20 / *Reuse as an Ostrakon*

One of the best-known reuse applications for *amphora* sherds was as the support material (i.e., the object on which a text was written) for the production of *ostraca* (singular: *ostrakon*), that is, documents consisting of a text written on a sherd, usually in ink (Wilcken 1970: 3–19). Although *ostraca* are common finds at Roman-period sites in Egypt, they have been documented at only a handful of sites elsewhere in the Roman world, such as Dura-Europos in Syria, Masada in Israel, Bu Njem [Golas] in Libya, and Jerba and Carthage in Tunisia. Yet sherds would have been readily available virtually everywhere in the Roman world at essentially no cost, would have presented a convenient surface for writing in ink, and could have been used to produce durable documents that were reasonably easy both to store and to transport. In light of these advantages and the lack of similarly convenient and economical alternative support materials, it must be assumed that *ostraca* were produced in considerable numbers throughout the Roman world²⁸ and that their rarity outside Egypt is due principally to factors of preservation. Specifically, because the ink with which *ostraca* were written was an organic compound composed of carbon black and gum arabic, it seems likely that prolonged exposure to humidity has led to the decomposition of the writing in all but a limited number of cases in which *ostraca* happened to be deposited in extremely desiccated microenvironments (Marichal 1992: 5; Bagnall 1995: 10).

In Egypt, *ostraca* were produced from at least the third century B.C. through at least the seventh century A.D., with the bulk dating prior to the beginning of the fourth century A.D. (Wilcken 1970: 7).²⁹ The corpus of published texts embraces a wide array of documents, both official and private, including tax receipts, transportation receipts, contracts, letters, school exercises, and, very occasionally, passages from literary works.³⁰ Because sheets of papyrus and wooden tablets would have been fairly expensive to produce, whereas

sherds for the fabrication of *ostraca* were presumably free for the taking, one can assume that people of modest means in particular had recourse to the latter for the production of documents.³¹ Although it may be fair to assume that literacy was fairly limited among individuals of low socioeconomic status, this does not mean that documents played no part in their day-to-day lives (e.g., tax receipts were written out on materials provided by the taxpayer) (Bagnall 1995: 13), and they may often have made use of sherds for the production of these. Sherds were also presumably favored for the production of casual notes and the like. Cribiore, for example, has been able to demonstrate that in Graeco-Roman Egypt sherds were widely employed for the composition of short school exercises of the sort typically produced at the elementary level, whereas the lengthier exercises associated with advanced schooling were generally written on papyrus (Cribiore 1996: 63, 71, 73–4 Tables 1–3). *Ostraca* were also probably favored in certain remote locations, where it was likely difficult and/or prohibitively expensive to obtain either sheets of papyrus or wooden tablets, such as Bu Njem, a military outpost in the Libyan interior, and Wadi Umm Hussein.

Some *ostraca* may have functioned as amulets. Interesting evidence in this regard is presented by a papyrus of fifth century date, PGM CXXXIII a (Maltomini 1979: 64–5, *Pap.* 1 lines 48–50):

προς γενουσαν .ηξερθε ηκ του μνημιου σου χριστος σε καλ 1 //
ωστρακον δεξιω μερω.

[For women giving birth: “Come out of your tomb, Christ is calling you.”
A sherd on the right thigh.]

While the interpretation of this text is problematic, the most plausible suggestion is that the formula that it provides was meant to be written on the sherd to which it refers, with the resulting *ostrakon* to be placed on a woman’s thigh during labor in order to facilitate the process.

The study and publication of *ostraca* has been the realm of specialist papyrologists, and these scholars have for the most part focused almost exclusively on the reconstruction, translation, and interpretation of the texts that appear on them, according either scant or no attention to the consideration of *ostraca* as items of material culture.³² Further, because the vast bulk of the *ostraca* that have been published do not come from controlled excavations, there have been few efforts to evaluate *ostraca* against the background of their archaeological context (Bingen 1996: 29).³³

The scholarly literature thus has little to say about the kinds of pottery that were employed for the production of *ostraca*, the ways in which sherds were prepared for the production of a text, the ways in which texts were written on a sherd, or the ways in which *ostraca* were handled, stored, consulted, and discarded.³⁴ It appears, however, that the most common practice was to make use of whatever large, reasonably flat sherds happened to be at hand. This most often meant *amphora* sherds, and thus sherds from the classes of *amphorae* that were most abundant at the locale where the text was produced. According to Bailey, most Roman-period *ostraca* from Egypt were produced using sherds deriving from the Late Roman 7 and the Egloff 172, the most common Egyptian wine containers, though sherds deriving from the Late Roman 4, which was produced in neighboring Gaza, were also sometimes employed for this purpose (Bailey 1992). Similarly, the thirty-two *ostraca* recovered on the Îlot de l'Amirauté at Carthage (see next paragraph) were all produced using sherds deriving from *amphorae* of Tunisian origin (Peña 1998: 120–21). Again, the brief published descriptions of the 146 *ostraca* from Bu Njem suggest that most (perhaps all but one) were produced using sherds deriving from *amphorae* of Tripolitanian or, perhaps less likely, Tunisian origin (Marichal 1992: 15–16).

It appears that in the manufacture of *ostraca* sherds were selected with a view to their size and flatness,³⁵ and to the smoothness of their exterior surface, with perhaps less importance accorded to their overall shape and to the color of their surfaces.³⁶ In many cases, the highly irregular shape of the sherd employed for the production of a document suggests that it was not reshaped or, at any rate, not carefully trimmed to obtain a specific shape. In some cases, however, it is clear that sherds were reworked with an aim of this kind in mind. For example, at least twenty-five of the thirty-two Îlot de l'Amirauté *ostraca*, administrative documents pertaining to the handling of state-owned olive oil during A.D. 373, involved the use of a regular blank shaped by chipping (Peña 1998: 120–21). These are roughly rectangular in shape, with long straight sides and slightly curved short sides, and range in size from 14.0 cm high by 8.5 cm wide to 23.0 cm high by 13.5 cm wide, with the long axis corresponding to the vertical axis of the *amphora* from which they derived to minimize the curvature of the writing surface. These blanks could have been held snugly in the hand for the writing out of a document, and several such documents could have been nested together in a box or basket in the manner of a card file for convenient consultation (Figure 6.13).

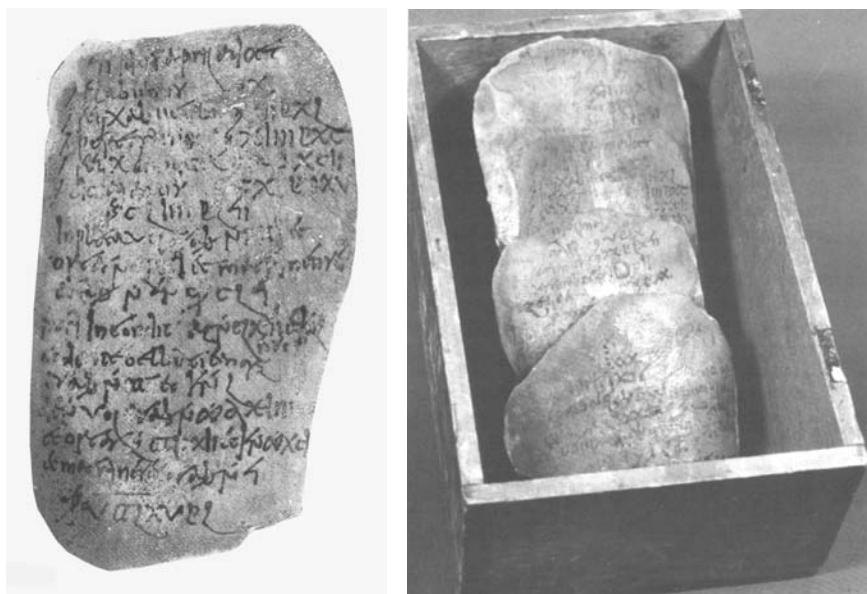


FIGURE 6.13. Ostraca fashioned from sherds from *amphorae* of Tunisian origin from Îlot de l'Amirauté site at Carthage. Left: single *ostrakon*. Right: group of four *ostraca* arranged as file in wooden box (reconstruction). Peña 1998: 121 figs. 1, 2.

In the vast majority of cases the text was written on the side of the sherd corresponding to the exterior surface of the vessel from which it derived (Wilcken 1970: 17–19). This was presumably due to the fact that the convex shape of this surface was more suitable for the production of a text. In Egypt, there was the additional consideration that a large portion of the *amphorae* of regional origin were provided with a pitch coating on their interior surface that, because of its dark color, would have rendered this side of the sherd unsuitable for the writing of a text (Wilcken 1970: 16). In some instances texts were written on the interior surface of the sherd, whereas in others a text was carried over from the exterior surface to the interior surface. Several of the *ostraca* consisting of school exercises, for which Cribiore has provided photographic documentation, were written on the exterior surfaces of *amphora* sherds, presumably deriving for the most part from Egyptian wine *amphorae* that bear more or less pronounced ribbing. In most, though not all, of these cases the lines of the text are oriented more or less parallel with the ribs, which may have been employed as guidelines.³⁷ Others of these texts were written on sherds with striations produced by

the smoothing of the vessel's surface. Here again, although the lines of these texts were usually oriented more or less parallel with these striations, in some instances they were oriented perpendicular to them.³⁸ Interestingly, in some cases multiple texts were written on a single sherd, with one or more secondary texts sometimes crammed onto the exterior surface along with the original text, or placed on the sherd's interior surface. In yet other cases, a text written on the exterior surface of the sherd was obliterated to make room for another text (Wilcken 1970: 12). These practices are of a certain interest, as they point, somewhat surprisingly, to efforts to economize on the use of sherds for the production of documents. Because sherds suitable for the production of a document presumably could have been obtained at no cost, the consideration at play must have been one of convenience.

6.21 / *Reuse as a Label*

The excavations at both Wadi Umm Hussein and Berenike have recovered reworked sherds pierced by a hole toward one end that probably functioned as labels (Tomber 2006: 293–4). Of the twenty-three examples from Wadi Umm Hussein, five have been published. Two were cut from sherds deriving from examples of the Egyptian Biconical *amphora*, and one from a sherd perhaps deriving from a large storage jar. These have either an oval or a subrectangular shape and range in size from ca. 9 cm long by 5 cm wide to ca. 13 cm long by 9 cm wide. Although none of these items preserves traces of writing, one example from Berenike retains a piece of string threaded through the hole. Tomber (2006: 293) has suggested that these items probably served the same function as the wooden labels that have been recovered at Wadi Umm Hussein (Hamilton-Dyer and Goddard 2001: 371–3, 380 fig. 12.1). Of the twenty of these items, ten bore traces of writing. In the eight cases in which the text could be deciphered it consisted of the name of an individual. An *ostrakon* from Wadi Umm Hussein (*O. Claud.* 248) refers to the use of a label to identify the intended recipient of a bundle being sent up to the quarry from the Nile Valley by camel, and it seems possible that both the wooden and pottery labels recovered at these two sites were employed for a purpose of this kind.

6.22 / *Reuse as an Ossuary*

Amphorae with their tops removed and perhaps also unmodified *amphorae* were sometimes employed as ossuaries, that is, containers for the burial of the bone and ash that remained after the cremation of a body. Although it

might have been possible to employ examples of certain *amphora* classes for this purpose without any modification, in most cases the removal of all or part of the upper portion of a vessel would have significantly facilitated the introduction of cremated remains. A passage in Propertius (*Elegiae* 4.5.75) should perhaps be understood as indicating the existence of this practice in central Italy during the last quarter of the first century B.C.: *sit tumulus lenae curto vetus amphora collo*. [Let this be the burial mound for a bawd: an old *amphora* with its neck cut down.] Although there are no clearly documented archaeological examples of this practice from the Rome region, possible examples are known from the Via Triumphalis necropolis, near the Vatican,³⁹ and the Isola Sacra necropolis.⁴⁰ Elsewhere, Callender listed certain or possible examples of *amphorae* with their tops removed, in most cases Dressel 20s, that had been employed as ossuaries from a number of sites in England, including Maidstone, Ospringe, London, Baldock, Colchester Sheepen, Lincoln [Lindum Colonia], and York [Eburacum] (Callender 1965: 25–30). From this evidence it appears that this was a common practice in England during a period of time extending from the second half of the first to the second or third century.

6.23 / Reuse as a Sarcophagus

In some parts of the Roman world, including peninsular Italy, Sardinia, Tunisia/Algeria, and northeastern Spain, *amphorae* and *amphora* parts were regularly reused as sarcophagi, that is, containers that held the remains of a deceased individual for inhumation burial. In peninsular Italy, necropoleis that contain inhumation burials with sarcophagi fabricated from *amphorae* and/or *amphora* parts are known at Ostia/Portus (Calza 1940: 45 fig. 9, 46 fig. 10, 55, 80; Toynbee 1971: 102; Pavolini 1983: 262; 1986: 253), Rome (Meneghini and Santangeli Valenzani 1993; Ricci and Sagui. 2001: 249; Meylan Krause 2002: 46), Poggio Gramignano (Soren and Soren 1999: 461–651), Pagliano (Morelli 1957: 38–40), Pisa/San Rossore (Bruni 2000: 40), Porto Recanati (Mercando 1974: 287–8, 350, 364, 370), Ravenna/Classe (Brizio 1904; Maioli 1980: 218 n. 17; Maioli and Stoppioni 1987: 56–63), and Aquileia (Calza 1940: 55); on Sardinia, at Castelsardo, Cagliari [Caralis], Decimo, and Olbia [Olbia] (Brizio 1904, 180, 190); in Tunisia/Algeria, at Salakta [Sullethum] (Hannezo 1892: 286), Lamta [Leptiminus] (Ben Lazreg, Mattingly, and Stirling 1992: 319–20; Mattingly et al. 1992; Osborne and Stirling 1992; Mattingly Stone, Stirling, and Ben Lazreg 2001; Dore and Schinke 2001; Rife 2001a; 2001b), El Djem [Thysdrus] (Bouchenaki

1975: 168 n. 480), Sfax [Tapadura] (Brizio 1904, 178, 180), Carthage (Ellis, Humphrey, and Marshall 1988; Humphrey and Kilgore 1988; Stevens 1995), Henchir Thina [Thaenae] (Ben Lazreg et al. 1992: 319 n. 28; Bouchenaki 1975: 168, n. 478), Skhira [Larsicus] (Bouchenaki 1975: 168 n. 479), El-Mahrine (Ben Lazreg et al. 1992: 319 n. 28), and Tipasa (Bouchenaki 1975: 167–8); and in northeastern Spain, at Ampurias [Emporiae] (Keay 1984: 1:9–11, 13–14), Barcelona [Barcino] (Keay 1984: 1:30–36), and Tarragona [Tarraco] (Keay 1984: 1:21–7). A comprehensive survey of the archaeological literature pertaining to these and other regions of the empire would presumably permit this list to be expanded considerably.

The evidence from the sites named above indicates that modified *amphorae* and *amphora* parts were widely employed as sarcophagi in these four regions during the middle and, in particular, the late imperial period for infant, child, and adult burials. It appears to have been a particularly common practice to employ a small-, medium- or large-sized container of Tunisian origin – either with the top removed, with the bottom removed, or with the top and bottom removed and then split into halves – as a sarcophagus for an infant or child (Keay 1984: 606; Ben Lazreg et al. 1992: 319; Remolà 2000: 119).⁴¹ Less common, though still widespread, was the practice of removing the top and/or bottom from two large- or very large-sized containers of Tunisian origin, splitting these into halves, and then laying these end to end to serve as the sarcophagus for an adult. One must assume that the widespread availability of empty containers of Tunisian origin, which would have lent themselves to reuse as sarcophagi on account of their large size and cylindrical shape, combined with the relative ease with which these vessels could be broken, chipped, or sawed into pieces, lay behind the popularity of these practices.

Descriptions of three representative burials from two necropoleis that have been subject to careful excavation will suffice to provide some idea of the range of specific arrangements adopted in connection with this practice. The first of these is from the fifth-century infant necropolis at Poggio Gramignano, in the central Tiber Valley (Soren and Soren 1999: 461–651). The cemetery contained forty-three burials, all infants, fourteen of which involved the use of a modified *amphora* or *amphora* parts as a sarcophagus (Soren and Soren 1999: 494–500). One of these, Burial IB 19, consisted of the remains of an infant ca. four to five months old inserted in an African 1 that had had its bottom detached (Figure 6.14). The lower part of the *amphora* was removed by means of chipping, with the operation producing a somewhat sloping and uneven cut. After the infant's remains had been set



FIGURE 6.14. African 1 *amphora* with lower portion removed and reattached for reuse as sarcophagus for infant burial at Poggio Gramignano necropolis. Søren and Søren 1999: pl. 241.

inside the upper portion the two parts were carefully reassembled, with a white substance – probably either lime plaster or gypsum – applied to the area around the juncture, presumably to seal the cut and/or bond the two pieces together.

The other two examples to be described come from the late second to middle/late fourth-century necropolis at Lamta, on the central Tunisian coast (Ben Lazreg et al. 1992: 319–20; Mattingly et al. 1992; Osborne and Stirling 1992; Mattingly et al. 2001; Dore and Schinke 2001). Here, excavations carried out in an area designated Site 10 uncovered ca. 100 adult and subadult burials, for the most part modest inhumations. Of these, thirty-eight burials, including thirty-one infant and seven adult burials, involved

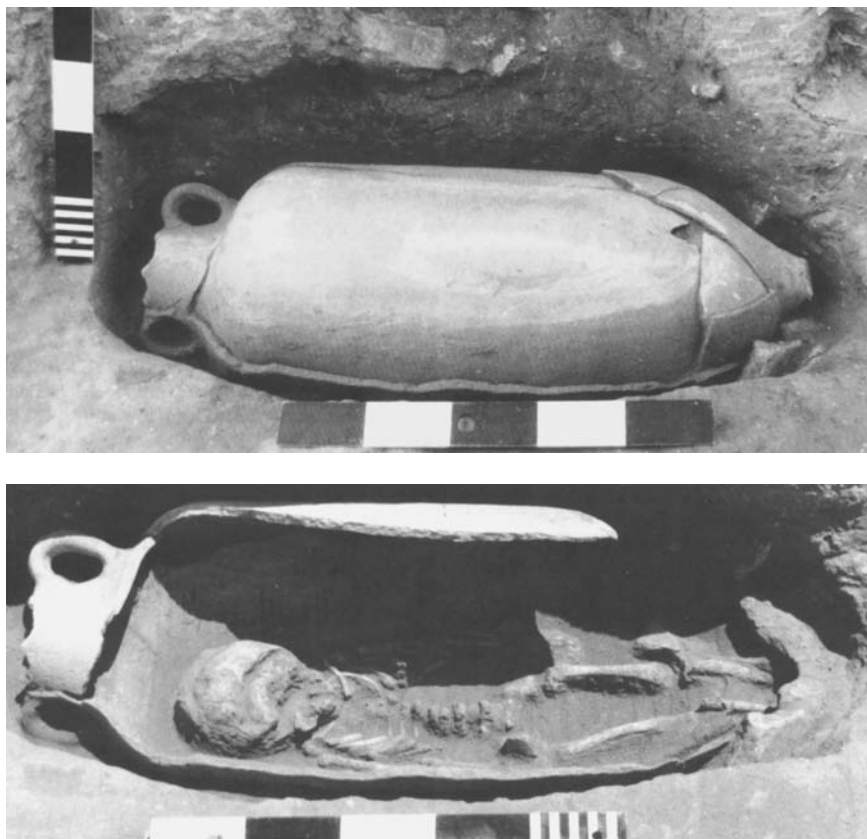


FIGURE 6.15. African 2 *amphora* split into halves employed as sarcophagus for child burial at Site 10 necropolis at Lamta. Top: *amphora* as found. Bottom: *amphora* after removal of upper half. Osborne and Stirling 1992: 288 figs. 40, 41.

the use of a sarcophagus consisting of one or more modified *amphorae* and/or *amphora* parts (Mattingly et al. 2001: 159). The first of the two burials to be described, Burial 143, involved the interment of a child aged ca. two years in an African 2 that had been split into halves (Mattingly et al. 1992: 213; Osborne and Stirling 1992: 287–8) (Figure 6.15). One of the two edges produced by this operation followed a straight, regular line from the neck down to the spike, indicating that it was produced by means of sawing. The other edge is irregular, departing from the first edge at the level of the vessel's handles, running across the shoulder, turning down the body, and then angling back across the lower wall to rejoin the first edge immediately above

the spike. This suggests that the second edge was produced by inserting one or more levers into the cut produced by sawing, with force then applied until a large piece of the vessel's side broke away. After the child's remains had been arranged inside the main portion of the vessel, the detached piece was set back in place. The vessel's rim was also removed, probably by means of chipping, apparently to ensure that the sarcophagus would fit into the burial trench. The second burial to be described, Burial 177, involved the interment of an adult female in a sarcophagus composed of three large-sized *amphorae* of Tunisian origin that apparently had had their top and/or bottom removed, been split into halves, and then been laid end to end (Mattingly et al. 1992: 185–6; Osborne and Stirling 1992: 294–5) (Figure 6.16).⁴² A

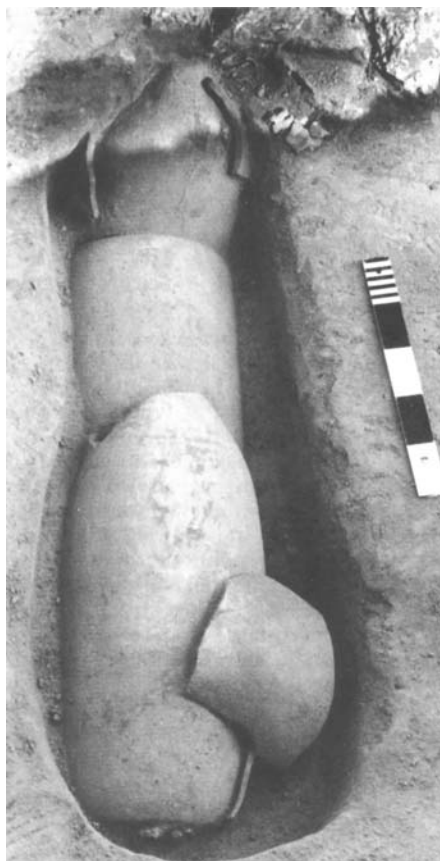


FIGURE 6.16. Three large *amphorae* of Tunisian origin employed as sarcophagus for adult burial at Site 10 necropolis at Lamta. Osborne and Stirling 1992: 295 fig. 52.

terminus post quem for the burial is provided by a *denarius* of A.D. 232 found on top of the sarcophagus. The three *amphorae* that were employed to construct the sarcophagus included a container that had had its rim/neck removed at the level of the shoulder by means of sawing and its bottom removed at the level of the lower wall by means of breaking and then had been split into halves by means of sawing, a container that had had its top removed at the level of the upper wall by means of sawing and presumably had had its bottom removed and then had been split into halves, and a container that perhaps had had its top removed at the level of the upper wall and then had been split into halves.

6.24 / *Reuse as a Planter*

Amphorae with their tops detached were sometimes employed as planters. The removal of the upper part of an *amphora* presumably facilitated its filling with soil, the planting of seeds or the transplanting of seedlings in this soil, and the subsequent care and watering of these. It seems likely that in some instances this modification was complemented by the drilling or punching of one or more holes in the bottom portion of the *amphora* to provide for drainage.⁴³

Jashemski has recorded three certain or possible instances of this practice at Pompeii and its environs. The sole certain example comes from a property at *Regio* 7, *Insula* 11, doorway 1 that Jashemski identified as a plant nursery, where excavations uncovered twelve *amphorae* of unspecified class that had had their tops broken off before being filled with soil and employed as planters (Jashemski 1993, 192). The possible examples come from the Casa della Nave Europa, where excavations uncovered a cluster of six vessels used as planters that Jashemski simply terms “half pots” (Jashemski 1974: 399, 1993: 62), and the Villa A, at Oplontis, where she records the use of “broken *amphorae*” as planters (Jashemski 1993: 300).

6.25 / *Reuse as an Architectural Element*

Amphorae and *amphora* parts were employed as architectural elements in three distinct applications: use as a block or a beam, use as a lightener or filler in concrete construction, and use as a fixture or inset.

6.25.1 / *Reuse as a Block or Beam*

Amphorae were on some occasions employed as blocks or beams in the construction of structures of various kinds. The several classes of small- and

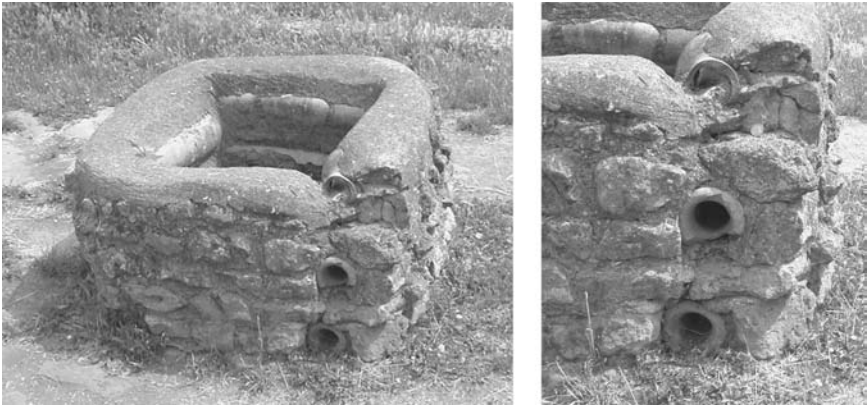


FIGURE 6.17. Wellhead constructed with Keay 26 *amphorae* in Semita dei Cippi at Ostia. Left: general view. Right: detail of corner, showing exposed mouths of *amphorae*. Photos: JTP.

medium-sized *amphorae* of Tunisian origin were particularly well suited for this application on account of their long, narrow proportions and general robustness. The known examples of this practice fall into two types. The first consists of applications that involved the use of *amphorae* as major structural elements in the construction of various kinds of fixtures and tombs. Several instances of this practice, all dating to the mid and late imperial periods, are known from Italy and Tunisia. The second type consists of applications that involved the construction of layers of *amphorae* above vaulting in order to provide support for a building's roofing elements. Several instances of this practice, all dating to the fifth century, are known from Milan and Ravenna.

A rectangular wellhead at Ostia represents a good example of the first of these two types of applications (Figure 6.17). This fixture, of fifth- or sixth-century date, is situated in the middle of the major thoroughfare known as the Semita dei Cippi, a short distance to the north of its intersection with another major thoroughfare, the Via della Fortuna Annonaria (Pavolini 1983: 210). Each of this fixture's four sides consists of three Keay 26s horizontally set one atop the other in a bedding of mortar. All twelve containers are oriented with their mouths to the left (to one observing from outside the fixture), permitting the spikes of the three vessels that constitute each of the four walls to be interleaved with the necks of those that make up the wall adjacent to it on the right. The indentations between the *amphorae* on the exterior side of the walls were chinked with irregular cobble-sized chunks of tufa, and the whole then mortared over. Although the mouths of

at least eight of the containers are today exposed at the structure's corners, it is not clear whether this was also the case in antiquity, or is rather the result of damage that has occurred since the time of the fixture's excavation. The sides of the *amphorae* were left exposed on the fixture's interior surface. All of the *amphorae* that are today substantially exposed appear to be intact, except possibly for the handles and/or spike in some cases.

A good example of the use of *amphorae* as a block or beam in the construction of a tomb comes from Salakta, on the central Tunisian coast. Here, several caisson tombs (structures consisting of an element in the form of a half-cylinder set atop a low, stepped base) of imperial date were provided with burial chambers in the form of a gable roof constructed of *amphorae* (Hannezo 1892: 285–6). Each burial chamber's two sloping side walls consisted of five or six *amphorae* – apparently mostly or exclusively cylindrical containers of local or regional origin. These were set side by side, alternately in right-side-up and upside-down position, presumably with a view to achieving a more stable and tightly packed arrangement.

Turning now to applications of the second of the two types of applications noted above, there are three known examples from Milan, all church buildings dating to the fifth century A.D. The most fully documented of these occurs in the Sacello di San Simpliciano (Bocchio 1990a). This structure, probably built during the early fifth century A.D., stood immediately to the north of the Basilica Virginum, in the northern suburbs of the city (Lusuardi Siena 1990). Here, at least two layers of *amphorae* were employed to build up the area above the extrados of the building's barrel vault. Each layer consisted of several parallel rows of *amphorae* laid tightly together in a bedding of mortar. Within each row the *amphorae* were arranged with the spike of one container inserted into the mouth of the next container in the row. The rows of containers in the two layers were oriented at right angles to one another, presumably with a view to obtaining a more robust structure. Although the number of *amphorae* employed in this construction is not recorded, a published sketch suggests that it involved at least twenty containers (Bocchio 1990a: 136 fig. 2a.30l), and the true number is likely to have been substantially larger than this, perhaps in the hundreds. The containers employed included Tripolitanian 3s, African 2s, Keay 25s, and Keay 26s, all classes of Tunisian or Tripolitanian origin in the small to medium size range.

The other two instances of this practice from Milan occur at San Ippolito and San Aquilino, both fifth century chapels that form part of the San Lorenzo Maggiore ecclesiastical complex (Bocchio 1990b). In the case of

San Ippolito, restoration work revealed a group of four *amphorae* incorporated in the extrados above the barrel vault. The two containers that could be identified included a Keay 35 and an African 2, whereas a third vessel was perhaps a Keay 62 (Bocchio 1990c: 146, 2a37.f.1, 2a.37f.2). In the case of San Aquilino, a drawing executed in the course of repair work indicates the presence of layers of *amphorae* above the extrados of the dome that served to provide a platform for the support of the tile roof. Several fragments of *amphorae* bearing mortar on their surfaces, which are today housed in the San Lorenzo Maggiore complex, apparently derive from this construction. These include examples of the African 1, African 2, Keay 25, and Keay 26, as well as unidentified containers of Eastern Mediterranean origin.

As discussed in Section 5.5, three late imperial *amphorae* of Tunisian origin recovered in the San Lorenzo Maggiore complex, including one of those originating in the vault above San Ippolito, bear *tituli picti* indicating that they were once employed for the packaging of foodstuffs in connection with a Church supply initiative of some kind. The evidence thus shows that once the containers employed in this initiative had been emptied of their content, a portion, at least, were reused (evidently for a second time) in Church-sponsored construction projects.

Two instances of this practice are also known from Ravenna, both dating to the fifth century. The first of these is the Mausoleum of Galla Placidia, which dates to the second quarter of the century (Ricci 1914: 8–13). Here, as at San Simpliciano and San Aquilino, in Milan, layers of *amphorae* were mortared in place to build up the extrados of the structure's central cupola and the four radiating barrel vaults in order to produce a more or less straight, sloping surface that could support the monument's tile roof. These containers appear to have consisted largely or entirely of Keay 26s. The other structure at Ravenna that employs *amphorae* in this way is the Arian Baptistery, dating to the late fifth century (Ricci 1914: 13–14). A description of repairs carried out on this monument in 1838 indicates that it possessed an arrangement of *amphorae* more or less similar to that attested for the Mausoleum of Galla Placidia, though with the containers arranged in a less regular fashion. The *amphorae* were described as having a spheroid body and a narrow mouth, which in some cases preserved traces of a plaster stopper. Some of these containers bore *tituli picti* in dark paint that were translated as "wine from Scyros." Although the identity of these vessels remains uncertain, the information available suggests that they may have been examples of the Late Roman 2 and/or San Lorenzo 7 *amphora*.

A possible example of this practice is also known from Albenga [Albina-gaunum], in Liguria, where cylindrical *amphorae* of Tunisian origin were employed in the construction of the cupola of the fifth-century baptistery (Lusuardi Siena 1990: 136; Freed and Ross 1990: 21 n. 20).

6.25.2 / Reuse as a Space Filler/Lightener in Concrete Construction

There are several structures of second- and fourth-century date in the Rome area that employ *amphorae* – principally Dressel 20s and Dressel 23s – as space filler/lightener elements in concrete construction. Lancaster has carried out a detailed study of this practice, and the discussion that follows is based principally on her work (Lancaster 2005: 68–85, 215).

The instances of this practice appear to be limited exclusively or almost exclusively to two discrete time periods, the A.D. 120s–130s and the first half of the fourth century. The first of these chronological groupings includes four buildings, two of which are included in Lancaster's study. These consist of an unnamed building of uncertain function – probably a *horrea* or market – at Ostia at *Regio* 1, *Insula* 20, doorway 1, where there are at least twelve Dressel 20s inserted into the cross vaulting (Lancaster 2005: 70, 72 fig. 49, 215), and the Villa alla Vignaccia, situated at the fourth mile of the Via Latina, which contains at least eight Dressel 20s inserted into barrel vaulting and cross vaulting (Lancaster 2005: 70, 72 fig. 50, 73 fig. 51, 215). The other two instances are reported by Blake. These include a building at Ostia at *Regio* 3, *Insula* 1, doorway 8 (Blake 1973: 180), where she notes the presence of an unspecified number of vessels termed *ollae* inserted into the haunches of a collapsed piece of vaulting, and Hadrian's Villa, near Tivoli, where she records an unspecified number of *amphorae* of unknown class inserted into the half cupola of the *heliocaminus* [sunbathing facility] (Blake 1973: 242, 256).

Lancaster has documented nine structures belonging to the second of the two chronological groupings. Four of these are buildings located in Rome. These include the Basilica of Maxentius, probably built during the period A.D. 308–315, where there are several *amphorae* inserted in the barrel vaults, generally in inverted position, including an example of the Almagro 51C (Lancaster 2005: 215); the Temple of Minerva Medica in the Horti Liciniani, built at some point during the first quarter of the fourth century, where there are ca. forty Dressel 20s inserted into the dome (Lancaster 2005: 78 fig. 57); the so-called Temple of Venus and Cupid, built on the grounds of the Sessorian Palace during the first quarter of the fourth century,

where there is one container, perhaps a Dressel 23, inserted into a semidome (Lancaster 2005: 215); and, finally, the Arch of Janus in the Forum Boarium, built during the first half of the fourth century, where there is an unknown number of Dressel 20s embedded in the cross vault (Lancaster 2005: 215). Outside of Rome, the Circus of Maxentius, constructed at the third mile of the Via Appia during the period A.D. 308–312, contains a large number of containers – for the most part Dressel 23s, but also some Dressel 20s – in the vaulting of the *cavea* (Lancaster 2005: 75–7 fig. 56) (Figure 6.18). Rodríguez-Almeida estimates that the construction of this facility involved the use of at least 6,000, and more probably ca. 9–10,000 of these vessels (Rodríguez-Almeida 1984: 166–7; 1999: 241–5; 2000: 125–6). The Mausoleum of Helena (Tor Pignattara), at the third mile of the Via Labicana, constructed during the period ca. A.D. 326–330, contains an estimated 180 vessels, including Dressel 23s and perhaps also Dressel 20s, inserted into its dome (Lancaster 2005: 215). The mausoleum known as Tor de' Schiavi, located at the third mile of the Via Praenestina and constructed at some point during the early fourth century, contained an estimated 315 *amphorae*, probably Dressel 23s, inserted into its cross vaults (Lancaster 2005: 78/80, 215). The Octagonal Room at the neighboring Villa of the Gordians, built at roughly this same time, contains at least ten Dressel 23s inserted into its dome (Lancaster 2005: 79 fig. 58, 215). Finally, the church of Santa Maura, a structure of fourth- or fifth-century date located on the Via Casilina, contains ten Dressel 23s inserted into a semidome (Lancaster 2005: 83 fig. 59, 84, 215). Perhaps to be associated with this chronological group is the use of at least ten African 1s in the vaults of the arcades added to the façade of the apartment building in the Via Giulio Romano at the foot of the Capitoline Hill, in Rome (Lancaster 2005: 75, 76 fig. 55, 215).

On the basis of a series of calculations, Lancaster has concluded that the insertion of intact *amphorae* into concrete vaulting was undertaken in most cases not so much to limit the weight that the load-bearing elements of these structures would have been obliged to support, but rather to reduce the amount of construction material that would have been required to complete the project (Lancaster 2005: 76–7). What is striking about the evidence relating to both of the periods for which this practice is attested is the fact that, with the exception of the single example of the Almagro 51C recorded for the Basilica of Maxentius and the example of the African 1 *amphora* documented for the apartment building in Via Giulio Romano, all of the containers identified by class, either with certainty or on a tentative

basis, are examples either of the Dressel 20, the standard oil container from southern Spain, or of its smaller successor, the Dressel 23. This suggests that these two classes of *amphorae* were systematically favored for this application, presumably because their globular shape and robustness relative to other classes of *amphorae* rendered them both particularly well suited for use as a space-filler and poorly suited for several other reuse applications for which used *amphorae* were commonly employed.

This inference is supported by the fact that these same two classes figure prominently in the limited number of instances of this practice that can be documented outside of Italy. Thus, at Italica, in southern Spain, Dressel 20s were inserted into the vault of the Casa de la Exedra, dating to the A.D. 120s–130s (Lancaster 2005: 70–71, 73 fig. 52), and used in the construction of the Termas de Adriano, built during the second quarter of the second century (Rodríguez-Almeida 1999: 235), whereas at Cologne [Colonia Arippinensis], on the Rhine frontier, the church of Saint Gereon, constructed ca. A.D. 360–380, has an estimated 125 Dressel 23s inserted into its vaulting (Lancaster 2005: 84 fig. 60). The uses of other classes of *amphorae* for this purpose are rare, and generally postdate the manufacture of these two classes.⁴⁴

Also worth noting is the preponderance of state/imperial construction projects among the group of fourth-century structures for which this practice is attested. During this period the state was involved in the carriage to Rome of large quantities of olive oil originating in Tunisia and southern Spain as part of its program for the distribution of food staples to the urban populace (Peña 1999: 25–8). In all likelihood, the bulk of this oil originated in Tunisia and southern Spain. The oil brought to Rome for this purpose appears to have been made available to authorized recipients in the form of a small, daily allotment distributed via facilities known as *mensae oleariae*. It seems likely that the *praefectura annonae*, the branch of the state administration responsible for the oil distribution program, would have found itself with large numbers of empty *amphorae* on its hands following the disbursing of the oil that they had held. As discussed in Section 10.5, whereas the containers of Tunisian origin could have been employed for a wide variety of reuse applications by virtue of their cylindrical shape, relatively small size, and relatively thin walls, the large, heavy, unwieldy, and robust containers from southern Spain would have been suitable for a substantially more limited range of reuse applications. By directing *amphorae* of the latter kind toward state-sponsored construction projects for use as space-fillers in concrete vaulting, the



FIGURE 6.18. Dressel 23 *amphorae* reused as lightening elements in *cavea* of Circus of Maxentius, near Rome. Left: general view. Right: detail. Photos: JTP.

praefectura annonae could have succeeded in disposing of substantial numbers of highly cumbersome and otherwise useless oil containers, while at the same time reducing the amount of lime, sand, and rubble that would have been required to complete these initiatives (Rodríguez-Almeida 1999: 235). In light of these benefits, it may, in fact, have been the practice to supply these projects with as many used Dressel 20s and Dressel 23s as they could absorb for this purpose.

6.25.3 / *Reuse as an Inset or Fixture*

Unmodified *amphorae*, modified *amphorae*, and *amphora* parts were employed on occasion as architectural insets and fixtures of various kinds. The most noteworthy application of this kind consisted of the insertion of unmodified *amphorae* and *amphorae* with their tops detached into the walls of *piscinae* [fish ponds] to serve as a *specus* [fish nest] (Jashemski 1979: 110; Higginbotham 1997: 27). This practice is widely attested within Italy, though appears to be rare outside the peninsula (Higginbotham 1997: 27 n. 69). The earliest documented instances date to the second century B.C., whereas the latest date to the first century A.D. Individual instances involved the use of anywhere from a handful to several score of containers. Thus, the three houses at Pompeii for which this practice is attested, the Casa dei Capitelli Colorati (*Regio* 7, *Insula* 4, doorways 35/51), the Casa di Gavio Rofo and an unnamed house at *Regio* 8, *Insula* 2, doorways 14/16, involve the use of one, three, and twenty-five containers, respectively (Jashemski 1979: 384 n. 94, 1993: 173, 206). The largest numbers attested for any one instance are the 298 containers employed for a set of three fish ponds constructed during the early to middle first century B.C. at Torre Astura, near Nettuno (Higginbotham 1997: 154–6), and the 119 containers included in the so-called Piscina di Lucullo, near Circeo [Circeii], in southern Lazio (Higginbotham 1997: 27). Although the literature includes no specific information regarding the classes of *amphorae* employed for this purpose, given the dates and locations of the known instances, it seems likely that these consisted for the most part of Dressel 1s and Dressel 2–4s.

Herculaneum and Pompeii have produced evidence for the reuse of *amphora* parts in a wide variety of additional architectural applications. At Herculaneum, the Casa del Mosaico di Nettuno e di Anfitrite (*Insula* 5, doorway 6/7) has produced an *amphora* neck employed as the drain for a cistern mouth (Jashemski 1993: 268). At Pompeii, the Giardino di Ercole (*Regio* 2, *Insula* 8, doorway 6) has yielded an *amphora* top employed as a water

conduit (Jashemski 1993: 94). In a study of the pottery embedded in the structures of the *Insula del Menandro*, Arthur documented three instances of the reuse of *amphora* parts as architectural insets. In one instance, what he terms “the upper part” of a Dressel 2–4 was set into the masonry hood over the hearth in the kitchen of the *Casa del Menandro*, apparently to function as a chimney (Arthur 1997: 328 no. 33).⁴⁵ In a second, the rim and neck of a container of unidentified class, though perhaps a Dressel 2–4 or Dressel 21–22, was set horizontally into the masonry next to the service door of the *Casa del Menandro* at a height of 85 cm, apparently to serve as a bar hole (Arthur 1997: 329 no. 52). The third instance documented by Arthur involved the insertion of the body of a cylindrical *amphora* of Tunisian origin into a wall adjoining the entrance to the *Casa del Menandro* (Arthur 1997: 330 no. 66). This element, which appears to have been set in place during the second or first century B.C., passed through the wall at a height 2.25 m above the ground as measured on the building’s exterior. Arthur suggested that it might have served as a light hole. Sogliano reported a similar use of an *amphora* of unspecified class with its top and bottom removed as a light hole in the *Casa del Vinario* (Sogliano 1889: 125). Jashemski has also documented several instances of this kind at Pompeii. In her study of the vineyard that occupied the whole of *Regio 2, Insula 5*, she noted five *amphorae* of unspecified class that had had both their tops and their bottoms detached, which were embedded in an upright position along the outside edge of a masonry dining couch (Jashemski 1979: 215, 216 fig. 315, 1993: 90). These were apparently intended to serve as sockets for posts that supported a trellis or awning of some sort.⁴⁶ She also documented two instances in which *amphorae* were mounted in an upright position on the upper surface of an enclosure wall, presumably to discourage intruders from gaining entry to a property by climbing over the wall. One was at a shop/house at *Regio 1, Insula 20*, doorway 5, where a garden wall was crowned with at least six *amphorae* of unspecified class (Jashemski 1979: 188; 1993: 68; Lancaster 2005: 75 fig. 54), and the other at the *Caupona di Erme (Regio 2, Insula 1, doorways 1/13)*, where a wall was crowned by an unspecified number of what Jashemski terms “broken” *amphorae* of unspecified class (Jashemski 1993: 75). It seems possible that *amphorae* employed for this purpose were first modified by having some portions of their tops broken away, to produce a jagged upper edge that would discourage would-be climbers. Finally, at the *Casa di Trebio Valente (Regio 3, Insula 2, doorway 1)*, an *amphora* was mounted on top of a masonry pillar in upright position, perhaps to serve as a reservoir (Jashemski 1993: 99).

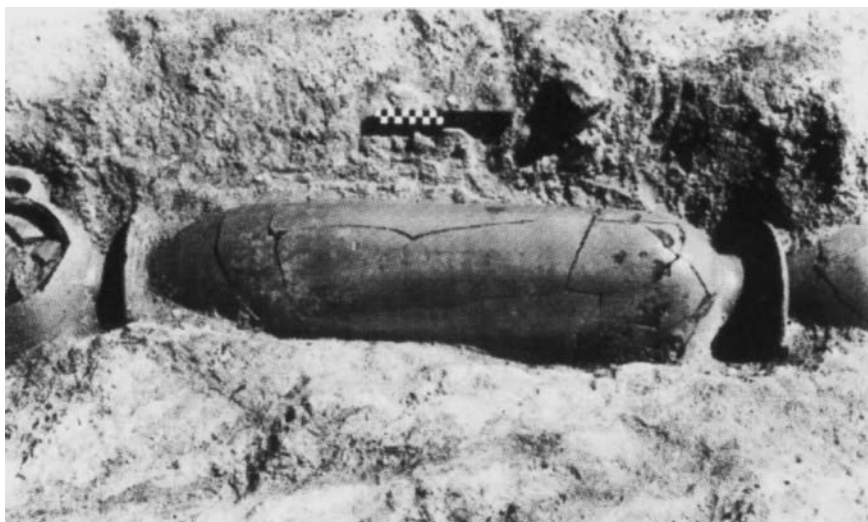


FIGURE 6.19. Drain constructed of Cintas 312 *amphorae* with bottoms removed at Campanaio. Wilson 2000: fig. 17A.

6.26 / Reuse as an Element in a Drain

Amphorae with their bottoms removed, *amphorae* with their tops and bottoms removed, and *amphora* tops were occasionally employed as elements in the construction of both vertical and sloping drains.⁴⁷ At Pompeii, for example, it appears to have been a regular practice to employ modified *amphorae* for the construction of vertical downpipes that served to transfer rain water and/or bodily waste from the upper part of a building down to ground level.⁴⁸ A good example comes from the house at *Regio* 1, *Insula* 10, doorway 8, where at least two and very probably several (five to six?) modified *amphorae* were employed in the construction of a fixture of this kind (Allison 2004: 117 fig. 5.23). In the preserved portion, two Dressel 2–4s that had had both their necks and bottoms removed were set one atop the other in upright position, with the lower edge of the upper container inserted into the opening at the shoulder of the lower one.

A good example of the use of modified *amphorae* for the construction of a sloping drain comes from Campanaio, a rural farmstead in western Sicily occupied from the Hellenistic through late imperial periods. Here, excavation uncovered the remains of a drain constructed during the period ca. 175–125 B.C. that consisted of five modified examples of the Cintas 312 *amphora* laid end to end inside a cut (Wilson 2000: 258–61) (Figure 6.19).

Each of these containers had had its bottom removed, with the resulting edge inserted into the mouth of the next container in the row.

6.27 / *Reuse as an Element in a Geotechnical or Hydrogeological Feature*

In some parts of the Roman world unmodified *amphorae*, modified *amphorae*, and, to a limited extent, *amphora* tops were regularly reused in a variety of constructions here termed *geotechnical features* and *hydrogeological features*. Geotechnical features comprise a family of feature types constructed with a view to stabilizing soils or raising the land surface, whereas hydrogeological features comprise a family of feature types constructed with a view to improving the drainage of soils (Manacorda 1998; Antico Gallina 1998; Balista 1998; Lunardi 1998: 44–6). These two categories of constructions embrace six distinct types of features:

Type 1: features intended to stabilize artificial cuts or land surfaces;

Type 2: structured landfills;

Type 3: features intended to improve the load bearing capacity of poorly drained soils;

Type 4: features intended to effect the aeration of soils or the vertical filtration of water;

Type 5: features intended to impede the temporary elevation of the water table;

Type 6: features intended to effect the horizontal drainage of water.

Of these six types of features, Types 1–3 can be classified as geotechnical features, whereas Types 4–6 can be classified as hydrogeological features. Features of Types 3–6 (i.e., the last of the three types of geotechnical features and all three types of hydrogeological features) were generally associated with efforts to compensate for poor drainage or to improve the drainage regime, either for purposes of improving or reclaiming land or to facilitate the construction/maintenance of buildings, and for this reason are here referred to collectively as *drainage-related applications*. In the various applications subsumed under these six feature types, *amphorae*, due to their combination of size, rigidity, robustness, and light weight, were employed as structuring elements, that is, elements that could bear loads and/or provide a framework capable of supporting unconsolidated fill, including soil and rubble, preventing their shifting, subsidence, and/or erosion. *Amphorae* and *amphora* parts were also employed in these features as fill.

Not surprisingly, instances of the four drainage-related applications are limited principally to areas that suffered from periodic inundations, a high water table, and/or highly impermeable soils. Three regions in particular have yielded conspicuous concentrations of features of these four types: the Po Valley/Veneto region of northern Italy, the Tyrrhenian coastal region of west central Italy, and central and southern France, with a particular concentration in the central/lower Rhône Valley.

A conference held in Padua in 1995 was dedicated to the examination of the reuse of *amphorae* for drainage-related applications, with the proceedings published in 1998 (Pesavento Mattioli 1998). The bulk of the contributions to this volume are concerned with instances from the Po Valley/Veneto region and the use of *amphorae* for drainage-related applications is thus particularly well documented for this part of the Roman world. The various articles in this work document the widespread use of *amphorae* in the construction of drainage-related features in this region from the middle of the first century B.C. through the early second century. A more limited number of instances date to later periods, with some constructed as late as the late fourth or fifth century. The list of locales for which examples of these applications are documented includes, from west to east, Piacenza [Placentia] (Marini Calvani 1998), Fiorenzuola [Florentiola] (Marini Calvani 1998), Cremona [Cremona] (Mariotti 1998; Passi Pitcher 1998), Fidenza [Fidentia] (Marini Calvani 1998), Calvatone (Lavizzari Pedrazzini 1998), Parma [Parma] (Catarsi Dall' Aglio 1998; Marini Calvani 1998), Verona [Verona] (Cavaliere Manasse 1998), Este [Ateste] (Michelini and Mazzochin 1998), Padua [Patavium] (Cipriano, Mazzochin, and Pastore 1998; De Vanna 1998; Moneti and Stocco 1998; Pesavento Mattioli and Ruta 1998), Adria [Hatria] (Toniolo and Vallicelli 1998), various locales around the Lagoon of Venice (Fozzati and Toniolo 1998), Altino [Altinum] (Tirelli and Toniolo 1998), Oderzo [Opitergium] (Tirelli et al. 1998), Concordia Sagittaria [Julia Concordia] (Croce Da Villa and Sandrini 1998), Sevegliano (Buora 1998), Codroipo (Buora 1998), and Aquileia (Maselli Scotti 1998). Probably to be associated with this regional grouping are an undated instance from Turin [Augusta Taurinorum] (Dressel 1879: 193; Manacorda 1998: 12), several instances of mid-first-century date from Milan (Bruno 1998), an instance of early-fifth-century date from Classe (Maioli 1980: 218–21, tav. XXXVIII; Maioli and Stoppioni 1987: 44–6), and an instance of mid-first-century date from Pula [Pola], in Croatia (Bezeczky 1998).

Although the various examples in this regional grouping generally involved the reuse of intact or largely intact *amphorae*, they also sometimes

included *amphorae* that had had their top, bottom, or both top and bottom removed, as well as *amphora* necks, *amphora* bottoms, and *amphora* sherds. In some cases it is evident that the individuals responsible for the construction of these features selected containers belonging either to a single class or to a restricted group of classes, apparently because the size and/or shape of the vessels in question rendered them particularly well suited for the task at hand. In others instances, however, the *amphorae* employed in the construction of a feature belonged to a wide range of classes of varying shapes and sizes, indicating that the individuals responsible for their construction made use of whatever empty containers they happened to have at hand. Three classes of containers were ubiquitous in the instances dating to the period running from the mid first century B.C. to the early second century: the Lamboglia 2, the Dressel 6A, and the Dressel 6B. All three of these classes were manufactured in Adriatic/Northern Italy, including the region in question, with the first two probably employed primarily for the packaging of wine, and the third primarily for the packaging of oil. Also employed on a regular basis in the construction of these features were examples of the Dressel 1, the Dressel 2–4, the Forlì *amphora*, and the Rhodian *amphora*, all wine containers, the Dressel 20, an oil container, and the Dressel 7–11, a fish products container. Features dating to the later period involved the use of examples of the African 2, Almagro 51, Keay 25, and Keay 26.

There is considerably less evidence for features of these kinds from the Tyrrhenian coastal region than there is for the Po Valley/Veneto region. Here, three examples are known from the Piana di Fondi [Fundanus Lacus] area, in southern Lazio, dating to the second half of the second or the first century B.C. (Quilici Gigli 1998: 16–18), three from Ostia, one dating to the late second or early first century B.C. (Boersma, Yntema, and van der Werff 1986: 96–9), one to the early to mid first century (Hesnard 1980; Rivello 2002), one to the middle of the third century (Zevi 1972, 415–19), and one from Vada Volterrana, in northern Tuscany, dating to the second half of the fourth century (Pasquinucci, Menchelli, and Del Rio, 1998). The examples of republican date, namely, those from the Piana di Fondi and the earliest of the three from Ostia, made use of examples of the Dressel 1, a wine container of regional origin. The early-first-century instance from Ostia employed a variety of containers of both regional and nonregional manufacture, including the Dressel 2–4, Dressel 6, Pascual 1, Haltern 70, Rhodian *amphora*, and Koan *amphora*, all wine containers, the Brindisi *amphora*, Dressel 20, Dressel 26, and Tripolitanain 1, all oil containers, and the Dressel 7–11, which served for the packaging of fish products. The

third-century instance from Ostia made use of examples of the African 2 and the Tripolitanian *amphora*, whereas the fourth-century instance from Vada Volterrana employed examples of both the African 2 and the Keay 25, all oil or fish products containers of nonregional origin. As with the examples from the Po Valley/Veneto region, those from the Tyrrhenian coastal region for the most part utilized containers that were either intact or largely intact.

As part of the Padua conference, Laubenheimer published a useful overview of the somewhat more extensive evidence for the various instances of the four drainage-related applications from southern France (Laubenheimer 1998). The numerous examples in this regional grouping can be divided into two general periods – the second/first century B.C. and the first century – with a small number of later instances. For the earlier of the two periods, several instances are attested in the central/lower Rhône Valley at Lyon [Lugdunum] (Laubenheimer 1998: 48, 50) and Arles [Arelate] (Laubenheimer 1998: 50–52). In central/southern France, more generally, instances have been documented at Clermont Ferrand [Augustonemetum] (Laubenheimer 1998: 49), Cordes (Laubenheimer 1998: 48), and the *oppida* at Mont-Beuvray (Laubenheimer 1998: 48), Toulouse [Tolosa] (Laubenheimer 1998: 48), Monfo (Laubenheimer 1998: 49–50), and Châteaumeillant (Laubenheimer 1998: 49). These involved the reuse of examples of the Greco-Italic *amphora* and the Dressel 1, both wine containers of nonregional origin, generally intact, though not infrequently with either their tops or both their tops and bottoms removed, or reduced to sherds. For the later period, numerous instances are attested at locales in the central Rhône Valley at Lyon (Laubenheimer 1998: 54–8) and Vienne [Vienna] (Laubenheimer 1998: 59–63). Outside the central Rhône Valley, one instance is known from the vicinity of Narbonne (Laubenheimer 1998: 67) and several from Fréjus [Forum Iulii] (Laubenheimer 1998: 63–7; 1991b), with one of these latter dating to the second half of the second century. The bulk of these cases involved the use of a mixed group of containers belonging to several different classes of both regional and nonregional origin, typically including examples of the Haltern 70, Pascual 1, Dressel 2–4, Dressel 7–11, and Dressel 20. Containers belonging to the various classes of flat-bottomed Gallic *amphorae* tended to be employed only in limited numbers, presumably due to their small size and fragility. Some of the instances from the central Rhône Valley, on the other hand, made exclusive use of Dressel 20s, presumably seeking to take advantage of the superior robustness offered by this class. Similarly, two instances dating to the second half of the third or first half of the fourth century, one

from Carpentras [Carpentorate] (Laubenheimer 1998: 67), the other from Nîmes [Nemausus] (Laubenheimer 1998: 67–8), both in the lower Rhône Valley, made exclusive use of examples of the successor to this class, the Dressel 23.

The approach employed here is first to examine the category of geotechnical features, describing an illustrative example of each of the three feature types subsumed under it, and then to examine the category of hydrogeological features, describing illustrative examples of the three different feature types subsumed under it.

6.27.1 / *Geotechnical Features*

As previously noted, the category of geotechnical features embraces three distinct types of features: features to stabilize artificial cuts and land surfaces, structured landfills, and features to improve the load-bearing capacity of soils.

In the first of these three feature types, arrangements of *amphorae* were employed to produce retaining elements that protected exposed surfaces from erosion or, in the case of cuts, supported these against collapse. A good example of this feature type comes from the Ile des Sables quarter at Arles, in the lower Rhône Valley (Laubenheimer 1998: 50–52). In this instance, salvage work undertaken in an area adjacent to the Rhône River revealed portions of roughly one dozen lines of *amphorae* set into the ground in an upright position that ran parallel and perpendicular to one another. The containers were mostly or entirely Dressel 1s, often with part or all of their necks removed, and were generally filled with the same silty soil into which they were inserted. In one instance, two of the lines intersected to form a corner, whereas, in another, two parallel lines situated ca. 1 m apart were set at slightly different levels, forming a stepped terrace arrangement (Figure 6.20). Similar lines of *amphorae* were uncovered in an excavation carried out a few dozen meters away and appear to represent an extension of this same set of features. This evidence points to the construction of an extensive grid of retaining walls from empty wine *amphorae* at some point during the first century B.C. with a view to stabilizing a land surface that was presumably subjected to periodic flooding from the nearby river.

The second of the three feature types that constitute the category of geotechnical features, structured landfills, consists of regular arrangements of *amphorae* combined with unconsolidated materials (as opposed to fills consisting of *amphorae* and other materials deposited in a haphazard fashion) created either inside a preexisting depression, such as a ditch or a pit, for



FIGURE 6.20. Section of built landscape feature consisting of two parallel rows of Dressel 1 *amphorae* set into land surface at different levels at Ile des Sables site at Arles. Laubenheimer 1998: 52 fig. 12.

the purpose of filling this, or on top of a land surface with a view to raising ground level over a broad area. A good example of this feature type is known from the ex Campo Fiera area of Verona (Cavaliere Manasse 1998: 186–92). This locale, situated on the right bank of the Adige River, ca. 500 m to the south of the walled area of the Roman town, was apparently a low-lying and poorly drained area during the Roman period. Excavations carried out in this area over a number of years uncovered portions of deposits of *amphorae* at several different points that suggest the presence of a cluster of built landscape features extending over an area of as much as ca. 10,000 square meters. The only detailed information available concerning these features regards a deposit of roughly 100 *amphorae* uncovered in 1990. In this case, the containers, which included Dressel 6As, Dressel 6Bs, and Dressel 7–11s, many of which had had their necks removed, were set upside down in a position slightly inclined from the vertical atop of a thick layer of river cobbles mixed with sand (Figure 6.21). After the *amphorae* had been set in position, the spaces between them were filled with sand, and the whole then covered with a layer of sand and gravel. Excavations in a different location uncovered a deposit of ca. 220 *amphorae* set right side up in a vertical position,

in some areas in a single layer, in others in two layers, whereas excavations in yet a third location uncovered a deposit of ca. 300 *amphorae* set upside down in vertical position. The classes of *amphorae* represented in these deposits and the stamps on several of the containers indicate that the construction of these features was carried out during the first half of the first century. These features appear to represent an effort directed at raising ground level over an extensive area by roughly 2.2 m, presumably for the purpose of providing a footing for the construction of buildings at a level that rendered them less prone to inundation by the nearby river.

The third and last of the feature types that constitute the category of geotechnical features consists of features intended to improve the load-bearing capacity of poorly drained, unstable soils (Antico Gallina 1998: 76–8). These generally consist of subfoundation features that were built for the purpose of enabling the soil in a specific area to support the weight of a structure. Constructions of this kind took one of three different forms: a small (ca. 1 m × 1 m or less), isolated feature intended to support an individual load-bearing element, such as a pillar, a linear feature intended



FIGURE 6.21. Section of built landscape feature constructed with Dressel 6A, 6B, and 7–11 *amphorae* set in position slightly inclined from vertical on bedding of river cobbles and sand at Ex-Campo Fiera site at Verona. Cavalieri Manasse 1998: 188 fig. 6.

to support a wall, or a more or less rectangular feature of large dimensions intended to support either a room, multiple rooms, or an entire building. In some instances, where a thin (ca. 1 m or less) layer of poorly drained, unstable soil overlay a more stable soil layer, the *amphorae* included in these features were set in a vertical position to serve, in effect, as piles, transferring the load of the overlying structure onto the lower soil layer. In cases where the layer of poorly drained, unstable soil extended to considerable depth, the *amphorae* were set in a horizontal position so as to spread the load placed on them over a large area, thereby enhancing the ability of the soil to support the overlying structure. A good example of this feature type comes from the *oppidum* at Monfo, near Beziers, in the Hérault region of France. Here, excavations uncovered several instances of the reuse of Greco-Italic *amphorae* and Dressel 1s for the improvement of drainage in and around structures of presumed second-century B.C. date (Laubenheimer 1998: 49–50). In one of these, *amphorae* that had had their necks removed were laid horizontally side by side in a row (presumably crosswise inside a foundation trench) in an alternating arrangement – that is, with one container positioned with its shoulder to one side, the next container positioned with its spike to that same side, and so forth – in order to serve as the subfoundation for a wall (Figure 6.22).

6.27.2 / *Hydrogeological Features*

As already noted, the category of hydrogeological features includes three distinct types of features: features to effect the aeration of soils or the vertical filtration of water, features to impede the temporary elevation of the water table, and features to effect the horizontal drainage of water.

Examples of the first of these three feature types were constructed in areas where the soil remained permanently saturated with groundwater (Balista 1998: 31–3; Antico Gallina 1998: 73–5). In this case, the aim was either to reduce the amount of moisture in the soil by introducing a deposit of material offering a degree of permeability higher than that of the surrounding soil and exposing the surface of this deposit to the air in order to promote the removal of moisture through evaporation, or, in areas where dense, impermeable soils tended to remain saturated with (or inundated by) surface water introduced by rainfall or flooding, to remove standing surface water and/or to reduce the amount of moisture in the soil by introducing a deposit offering a higher degree of permeability that would promote the downward movement of water into the subsoil (Balista 1998: 29–31). Features of this type generally consist of a ditch or a pit filled with intact *amphorae* positioned

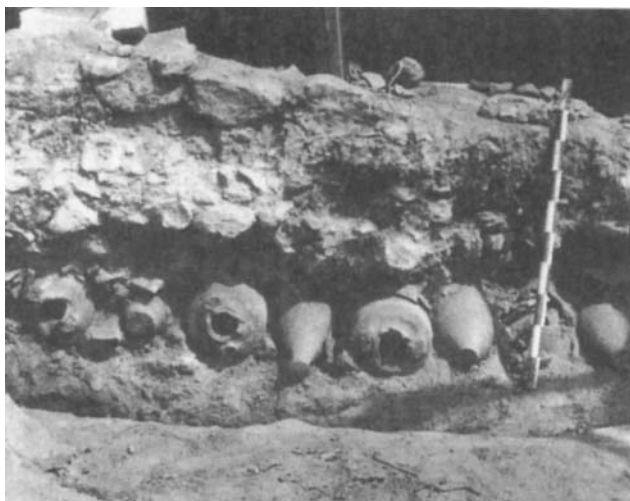


FIGURE 6.22. Section of built landscape feature consisting of row of Dressel 1 *amphorae* with necks removed set on side as subfoundation for wall at Monfo. Laubenheimer 1998: 51 fig. 8a.

in a more or less regular arrangement, with a highly permeable fill of some sort (e.g., sandy soil, construction rubble, sherds) packed around and also perhaps inside them. For greatest effect, the *amphorae* should be set in a vertical position and opened at both ends by the removal of their necks and either the removal or the holing of their bottoms in order to facilitate the passage of moisture in an upward or downward direction. In reality, however, these features sometimes include *amphorae* set in a vertical position with no effort made to open them at either end, *amphorae* set in a position inclined from the vertical, *amphorae* set in a horizontal position, and even *amphorae* simply tossed into the ditch or pit in a haphazard fashion.

A good example of this feature type is known from the Università Cattolica site, in Milan (Bruno 1998). Here, excavation uncovered an area of ca. 2,000 square meters in what had been the southwestern suburbs of the Roman-period city. In the middle decades of the first century this area was developed as a zone of modest courtyard residences. Among the structures associated with this phase were ca. twenty built landscape features consisting of subrectangular pits filled with *amphorae* and/or *amphora* parts. In several of these there were one or two levels of *amphorae* set in vertical position – some rightside up, others upside down – with holes punched in their bottoms (Bruno 1998, 262) (Figure 6.23). The most commonly represented classes appear to have been the Dressel 6A and Dressel 6B. The fact that some of these features contained two layers of *amphorae* suggests that they

were constructed with a view to obtaining depth rather than to achieving maximum ground-level surface area. Also worth noting is the fact that most of them were deliberately topped with a layer of fairly impermeable, silty soil. Taken together, these two observations suggest that these features were constructed for the purpose of eliminating moisture via downward filtration rather than by means of aeration.

The second of the three feature types that constitute the category of hydrogeological features consists of features intended to impede the temporary elevation of the water table (Balista 1998: 29–31). Features of this kind were constructed in areas where temporary, generally seasonal rise in the level of groundwater threatened the integrity of structures and/or resulted in the presence of pools of standing water on the ground surface. In ideal form, they consist of a ditch or a pit cut down from ground level to a formation consisting of well-drained soil. This is filled with intact *amphorae* set in inverted position that have permeable fill packed around, though not inside of them. The whole is then sealed by having a layer of impermeable material, such as soil with a high silt or clay content, placed over the top. With a rise in the water table, the pore air present in the soil is forced upward, where it becomes trapped inside the *amphorae*. This produces an interruption in the upper surface of the water table, permitting ground water to be captured and removed by means of horizontal drainage features such as those to be described next.

A good example of this feature type was documented in the course of the excavations undertaken at the Via Trieste, Number 13 site, in Padua (Monetti and Stocco 1998: 178–9; Balista 1998: 29–31). This work, carried out in the area of a necropolis located on the outskirts of the Roman-period settlement, uncovered the remains of a large burial enclosure overlying a hydrogeologic feature dating to the later first century B.C. or the first century A.D. The latter consisted of a ditch cut down through a series of relatively impermeable soil layers showing evidence for temporary saturation by ground water to the level of a layer of highly permeable sandy soil. Several dozen intact *amphorae*, for the most part Dressel 6s and Dressel 2–4s, were placed inside the ditch in an inverted position, with their mouths in contact with the sandy layer. A fill of soil similar in texture and composition to that of the sandy layer was packed around the *amphorae*, and the whole then covered with a layer of relatively impermeable silty soil.

The third and last of the feature types that constitute the category of hydrogeological features consists of features constructed to effect the



FIGURE 6.23. Built landscape feature consisting of pit filled with *amphorae* with holed bottoms in inverted position at Università Cattolica site at Milan. Bruno 1998: 261 fig. 2.

horizontal drainage of water (Antico Gallina 1998: 73; Balista 1998: 33). Features of this kind functioned by capturing subsurface or surface water over a broad zone and transferring this to true drainage conduits, such as covered drains, canals, or streams. In ideal form, they consist of a relatively long ditch cut down to a point below the water table that is filled with unconsolidated material more permeable than the surrounding soil, such as gravel, sand, or rubble. This produces a localized depression in the upper surface of the water table, allowing the capture of subsurface and surface water and the channeling of this away from the area by means of a constant decrease in the gradient of the ditch. *Amphorae* or *amphora* parts could be placed in the ditch to form a framework before the addition of the unconsolidated fill. In many cases this involved the creation of one or more parallel rows of *amphorae* set in horizontal position along the floor of the ditch, with the spike of each container inserted into the mouth of the one laid down immediately prior to it. Alternatively, *amphorae* could be set in an inclined position, with the lower portion of one vessel resting on the middle portion

of the vessel set in place immediately before it, or could be placed in a vertical position, either right side up or upside down, along the length of the ditch. The first of these arrangements would have proven advantageous for the construction of a long, shallow feature in instances where the supply of *amphorae* was limited, because the task could have been accomplished using only a modest number of containers. It should be emphasized that in features of this kind the water flowed around rather than through the *amphorae*, and there was thus no need to remove or hole the bottoms of the containers that were employed in them.

A good example of this feature type was uncovered in the course of salvage excavations undertaken along the Viale Mentana at Parma (Catarsi Dall'Aglia 1998). This work, undertaken in an area that lay outside the Roman-period town, uncovered a section of a feature consisting of a long ditch that contained a complex arrangement of *amphorae* and a fill composed of unconsolidated debris, including both sherds and fragments of plaster. The arrangement of *amphorae* consisted of pairs of containers set side by side in a vertical position – sometimes right side up, sometimes inverted – at intervals along the floor of the ditch. These pairs of vertical containers served as supports for a chain of horizontally placed *amphorae* that ran the length of the ditch, each spanning the distance from one vertical pair to the next. At either of its extremities each of the horizontal *amphorae* was wedged between and rested on the upper parts of the *amphorae* that made up the vertical pair (i.e., either their shoulders, in the case of vertical pairs that were right side up, or their lower walls, in the case of vertical pairs that were inverted), with the vertical *amphorae* cut down to a level more or less even with that of the horizontal *amphorae* that they supported. Of the four containers that were identified, three were Dressel 8s and one a Dressel 20. Portions of similar drainage elements have been uncovered in the Via Palermo/Via Cuneo and the Via Trieste areas of Parma, and Catarsi dall'Aglia, the excavator of this feature, believes that all three belonged to a single drainage system over 2 km in length that ran alongside the road that connected Parma with Brescello, draining a low-lying area that was prone to flooding. As the portion of the system uncovered in the Via Palermo/Via Cuneo area involved the use of roughly 1,200 *amphorae* for the construction of a ca. 100-m-long section of ditch, Catarsi dall'Aglia estimates that the construction of the entire system probably involved something on the order of 20,000 containers. To judge from the *amphorae* employed in its construction, it appears that the system was realized at some point during the middle or later years of the first century.

7

The Reuse of the Other Functional Categories of Pottery



*This chapter considers the evidence for the reuse of the functional categories of Roman pottery other than *amphorae*, including *dolia*, cookwares, utilitarian wares, and tablewares.¹ Because these functional categories were not manufactured with the idea that they would serve their prime-use applications for a limited number of episodes, the category of Type A Reuse is not relevant to the consideration of their reuse. All of the reuse applications for which they were employed can thus be classified as Type B or Type C applications, that is, reuse involving an application different from the vessel's prime-use application without any physical modification, and reuse involving an application different from the vessel's prime-use application involving physical modification, respectively.*

The evidence for the reuse of vessels belonging to these functional categories is far less abundant than that for the reuse of *amphorae*, and it is clear that they played a substantially less significant role in the reuse of Roman pottery than did *amphorae*. The reasons for this are fairly clear. First, with the exception of *dolia*, the vessels belonging to these functional categories were substantially smaller than even the smallest *amphorae*, and for this reason could not be employed for many of the reuse applications for which *amphorae* were regularly utilized. Second, many of the vessels belonging to these functional categories remained in use for their prime-use applications for several years and were generally retired from prime use in small quantities and at irregular intervals. In contrast, *amphorae* probably became available for reuse in sizable groups on a fairly regular basis, often after no more than a year or so of use. Thus, for reuse applications that required any substantial amount of pottery, it would have been significantly more cost-effective either to collect used *amphorae* from establishments such as packaging or storage facilities for wine, oil, or fish products, communal dining establishments,

or bars that generated large numbers of empty containers on an ongoing basis, or to reclaim intact or largely intact *amphorae* from refuse middens than it would have been to collect refuse pottery belonging to the other functional categories from any of the sources from which this might have been obtained. It was presumably for these reasons that the reuse of vessels and vessel parts belonging to the other functional categories was not nearly as diffuse and as regular a practice as was the reuse of *amphorae* and *amphora* parts, and instances of this practice are limited for the most part to small-scale, seemingly adventitious applications. As just noted, *dolia*, because of their large size, represent something of an exception to this pattern, and for this reason the reuse of this functional category is in this chapter considered separately from that of the other functional categories.

7.1 / *The Reuse of Dolia*

There is a modest amount of both literary and archaeological evidence pertaining to the use of unmodified *dolia*, modified *dolia*, and *dolium* parts for a variety of reuse applications. Given the tendency for *dolia* to break along the junctures between the slabs and/or coils from which they were constructed, the removal of the upper or lower portions of *dolia* along a fairly regular line for some reuse application would have been a relatively simple procedure. Similarly, the splitting of *dolia* into two halves by means of two vertical breaks would have been facilitated by the tendency for these containers to develop vertical cracks in the rim/shoulder area due to shrinkage gradients that occurred during the drying and/or firing phases of the manufacturing process. The various reuse applications attested for *dolia* include the following: container, basin, furnace or oven, shelter, and architectural inset or fixture.²

7.1.1 / *Reuse as a Container*

Logical considerations suggests that *dolia* were regularly employed, sometimes presumably in the context of reuse, as containers for a variety of irregular substances (i.e., substances other than wine, oil, grain, legumes, and similar). This assumption is supported by a slight amount of literary and archaeological evidence. Manilius (*Astronomica* 5.676–9), writing in the first half of the first century, in describing the techniques employed for the catching of tunny, notes that in some cases, when large amounts of fish were caught by means of a seine net, these were brought on shore and placed in large basins and what he terms *Bacchi dolia* (i.e., wine *dolia*), presumably for

temporary storage. At Pompeii, Jashemski reported the presence at the Casa di Meleagro (*Regio* 6, *Insula* 9, doorway 2) of a *dolium* containing plaster (Jashemski 1993: 138).

7.1.2 / *Reuse as a Basin*

It seems likely that the bottoms and sides of *dolia* were regularly reused as basins. Although this practice is difficult to demonstrate archaeologically, in some cases *dolium* parts have been found in contexts that suggest that they were being employed for a purpose of this kind. At the Villa Regina, for example, the bottom of a *dolium* was found in the area outside the villa immediately in front of its main entrance, leading De Caro to speculate that it might have served as a basin for drinking water for chickens (De Caro 1994: 123).

7.1.3 / *Reuse as a Shelter*

Literary references to the Cynic philosopher who employs a *dolium* as a house (e.g., Juvenal *Satura* 14.308–10) should not perhaps be taken at face value. At Pompeii, however, excavations carried out by Jashemski in the Giardino di Ercole uncovered a structure consisting of half of a *dolium* split vertically mounted on four low masonry pillars, apparently to serve as a shelter for an animal, presumably a dog (Jashemski 1979: 279, 282 fig. 421, 283 fig. 422).

7.1.4 / *Reuse as a Furnace or Oven*

There is scattered literary and archaeological evidence that unmodified and modified *dolia* were employed as furnaces or ovens in a variety of industrial and cooking operations. Vitruvius (*De architectura* 7.12.1) describes the use of vessels that he terms *dolia* for the processing of white lead in Rhodes: *Rhodo enim doliis sarmenta conlocantes aceto suffuso supra sarmenta conlocant plumbeas massas, deinde ea operculis obturant*. [In Rhodes, they place brush suffused with vinegar inside *dolia*, and then lay lumps of lead on top, and close them with lids.] At Herculaneum, dye establishments located in a row of shops at *Insula Orientalis* 2, doorways 5, 11, 17, and 18 contained furnaces made of *dolia* pierced with holes and fixed in place in a masonry structure of some kind (De Vos and De Vos 1982: 286). At Wadi Umm Hussein, a communal kitchen facility that probably operated in the middle decades of the second century contained nine bread ovens (of which no more than five were in simultaneous use) constructed from what appear to be *dolia* that had had

their lower portions removed (Maxfield 2001: 59–61). These were each set inside a stone enclosure, sometimes in inverted position.

7.1.5 / *Reuse as an Inset or Fixture*

There is scattered archaeological evidence for the use of *dolium* parts as architectural insets or fixtures in applications similar to those described for *amphorae* in Section 6.25.3. Jashemski reported three such instances from Pompeii and one from Herculaneum. The first of those at Pompeii consisted of an underground wine cellar at the Caupona del Gladiatore (*Regio* 1, *Insula* 20, doorway 1) that had a *dolium* with its bottom detached set into its roof, presumably as an opening to provide both air and light (Jashemski 1979: 227 fig. 334, 228). The second was attested at a house at *Regio* 8, *Insula* 7, doorway 6, where the bottom half of a *dolium* was set into the corner of a basin (Jashemski 1993: 220). The third was attested at an economic facility of some kind at *Regio* 1, *Insula* 12, doorway 15, where what Jashemski terms “half of a *dolium*” (presumably the upper portion of the vessel) was employed as a *puteal* [wellhead] (Jashemski 1993: 55). At Herculaneum, she reports the use of a *dolium* neck as a *puteal* at the Casa del Bicentenario (*Insula* 5, doorways 15, 16) (Jashemski 1993: 269). At Piammiano, a structure of uncertain identification contained a well with a lining composed of the upper portion of several *dolia* (Figure 7.1).³ This feature, of probable first-century date, consisted of the upper portions of at least six *dolia* stacked one atop the other, with the lower edge of each resting on the shoulder of the vessel below it. The rims of the vessels thus projected inward with respect to the maximum diameter of the shaft, with their flat upper surfaces perhaps serving as steps that permitted a person to descend the well for maintenance purposes.

7.2 / *The Reuse of Cookwares, Utilitarian Wares, and Tablewares*

The reuse of cookwares, utilitarian wares, and tablewares involved varyingly the use of intact vessels, the use of vessels that had lost some part of their rim and upper wall, the use of vessel bottoms, and the use of modified and unmodified sherds. The various reuse applications attested for these three functional categories include the following: cup, bowl, or lid, container for a coin hoard, urinal/urine container, ossuary, grinding/polishing or cutting implement, *amphora* stopper or token, weight, *ostrakon*, sediment trap, and decorative inset. Sherds belonging to these classes were also presumably employed for the various casual applications noted for *amphora* sherds in Chapter 6, such as prop, support, or gaming piece.



FIGURE 7.1. Well lining constructed of *dolia* with bottoms removed at Piammiano. Photo: JTP.

7.2.1 / *Reuse as a Cup, Bowl, or Lid*

Logical considerations suggest that, in the case of the functional categories under consideration, vessels that had lost some part of their rim and upper wall, vessel bottoms, and large sherds were regularly employed as cups, bowls, and lids, in some cases following modification. This assumption is supported by a considerable amount of both literary and archaeological evidence.

In the realm of literary evidence, *Mishnah* Tohoroth Kelim 2.2, discussed in Section 4.2.1, implies that practices of this kind were common among Jews.

With regard to archaeological evidence, unmodified vessel parts are sometimes recovered in contexts that suggest that they were being employed in this way. At the Villa Regina, for example, it seems possible that both a casserole bottom and an *olla* bottom recovered in Room 10, a possible *cubiculum* [bedroom], were being reused as bowls (DeCaro 1994: 162, no. 108, 163, no. 109).

More definitive evidence for this practice is provided by modified vessels. For example, the desire to retain in use a vessel that had lost some portion of its rim and upper wall presumably lay behind the modifications carried out to numerous Gallic *Sigillata* vessels reported from London and Piercebridge

that involved the removal of the rim and some portion of the wall around the whole of the vessel's circumference by means of sawing or chipping, with the newly created rim often provided a smooth finish by means of abrasion (Marsh 1981: 229; Ward 1993: 20).⁴ Marsh notes that, at London, the most common expression of this practice involved the removal of the rim and outwardly bulged upper half of the wall on examples of the Dragendorff 27 cup and the removal of the rim and rouletted zone immediately below this on examples of the Dragendorff 29 bowl. Excavations at London have also yielded several Gallic *Sigillata* vessels that were modified by having a notch cut into the rim and upper wall (Marsh 1981: 229). It seems possible that in some cases these represent vessels that had suffered the loss of a chip from their rim and upper wall and that were subsequently modified to facilitate their use for a pouring operation of some sort. Given the fact that vessels modified by notching of this kind or by the more extensive cutting down of their rims and walls may have continued to serve more or less the same function that they had served before their assumed breakage, operations of this kind should perhaps be regarded as a form of maintenance.

Excavations at London, Piercebridge, and Chester have produced several examples of sherds preserving the lower portion of a Gallic *Sigillata* vessel that was sawn or chipped down to a point immediately above the ring foot (Marsh 1981: 229; Bulmer 1980: 89; Ward 1993: 20). Most of these fragments probably represent vessels that were modified for use – presumably in inverted position – as lids subsequent to the loss of their upper portions through breakage. Several examples, however, display substantial abrasion of the slip on the interior of the floor and/or on the underside of the floor inside the ring foot, suggesting that they may have been employed as grinding palettes – in some cases, apparently, in inverted position, with the ring foot serving as the vessel's wall.

Two nonjoining fragments from a Hayes 67 dish in African *Sigillata* D recovered in a context dating to the first half of the sixth century at the Palatine East probably represent a somewhat different expression of this practice (Figure 7.2).⁵ In this case, the outer zone of the vessel's stepped rim appears to have been deliberately broken away, leaving an irregular edge, whereas the exterior of its wall is covered with gouges, apparently produced with a punch, the creation of which resulted in the removal of virtually the whole of the vessel's exterior surface. These features appear to represent modifications carried out to the vessel so that it could be employed for some specific purpose. The slip has been chipped away over much of the upper

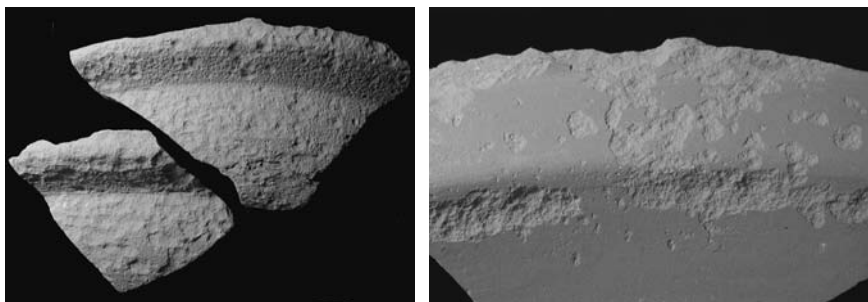


FIGURE 7.2. Portion of Hayes 67 dish in African *Sigillata* D with damage suggesting deliberate modification for uncertain purpose from Palatine East. Left: exterior view. Right: interior view. Photo: JTP.

surface of the rim, although it is unclear whether this occurred before or after the vessel's modification.

Elsewhere, although the tradition of reworking pots to produce cups and bowls at Wadi Umm Hussein that was described in Section 6.6 mostly involved the modification of *amphorae*, it did sometimes entail the reworking of vessels belonging to the functional categories under consideration. Tomber's catalog of pottery from the site contains fifteen such vessel, including one classified as cookware, thirteen classified as tableware, and one not classified as to functional category (Tomber 2006: 188).

That the lower portions of broken vessels were systematically reused for some application or other may also be inferred from quantitative patterning in site assemblages. At the Palatine East, for example, the assemblage presents persistent and pronounced disparities in the minimum number of vessel data for bases and rims for the various small- and medium-sized tableware forms in Fineware and Color-Coat Fineware, two classes of regionally manufactured tableware. These vessels consist for the most part of jugs, juglets, beakers, and bottles with rims of various shapes, a bulbous body with a thin, corrugated wall, a relatively thick disk base, and, in many cases, a single vertical handle. The vessels belonging to these forms tend to display a breakage pattern that consists of the breaking away and fragmenting into several small pieces of the rim, handle, and upper wall, with the remaining portion of the vessel, consisting of the middle/lower wall and disk base, remaining more or less intact. The disparity between the data for the minimum number of bases and that for the minimum number of rims for both of these classes may be due to some extent to differential recovery rates for these pieces, with the excavators recovering virtually all of the relatively large base/middle-lower

wall fragments, but only a substantially reduced portion of the generally much smaller rim fragments (Orton et al. 1993: 32, 179). That differential recovery does not account for all of this disparity, however, is suggested by the assemblage from Context A (105), the only context for which definitive data of this kind are currently available (Peña 1999: 152). In this case, there is a strong disparity of the sort noted despite the fact that the entire context was subjected to sieving. This suggests that the disparity in the representation of bases and rims for these vessels is due to a significant extent to reuse and/or discard practices. One possibility is that the relatively small rim sherds were dispersed and lost at or near the locus where the vessel to which they belonged was initially broken, whereas the much larger pieces consisting of the vessel's base and middle/lower wall were collected for discard, eventually reaching trash middens of the sort that produced the vast bulk of the site pottery assemblage. Another possibility, however, is that following their initial breakage these vessels continued to be utilized more or less as they had been used prior to their breakage, or were employed for some other purpose, such as a lid stopper for a bottle or *amphora*.

7.2.2 / *Reuse as a Container for a Coin Hoard*

Intact cookpots and jars were regularly employed as containers for coin hoards, in some cases perhaps in the context of reuse (de la Bédoyère) 1989: 204).⁶ A good example of this practice comes from Musarna, in northern Lazio, where a closed vessel manufactured in what appears in a published photograph to be a cookware fabric was employed as a container for a hoard of 994 *denarii* buried beneath the floor of a shop, probably in or shortly after either 67 or 64 B.C. (Catalli 1989b: 670; Andreau, Broise, and Catalli 2002: 29–34) (Figure 7.3). Closed forms with some part of their rim and upper wall missing and vessel bottoms were also sometimes employed for this purpose. The so-called Santa Marinella hoard, found near Santa Marinella, in northern Lazio, provides a good example of this practice (Catalli 1989a: 34). In this case, the bottom of what is described as a large vessel with red slip on its exterior surface was employed as the container for a hoard consisting of one bronze currency bar and seventeen pieces of *aes grave* (heavy cast bronze coins) at some point during the fourth or third century B.C.⁷

7.2.3 / *Reuse as a Urinal/Urine Container*

As noted in Section 6.4, it is widely assumed that closed ceramic vessels were regularly employed as urinals, with the urine collected in these turned



FIGURE 7.3. Cookware *olla* employed as container for coin hoard from Musarna. Berlingo, Broise, and Jolivet 1997: 281, courtesy Ministero per le Attività Culturali.

over to fullers for use in the fulling process. That vessels belonging to the functional categories under consideration were sometimes employed for this purpose, possibly in the context of reuse, is suggested by a modest amount of both literary and archaeological evidence.

Lucretius *De rerum natura* 4.1026–9 suggests that it was a regular practice to employ vessels termed *dolia* that had had their upper portion removed as urinals/urine containers: *puri saepe lacum propter si ac dolia curta somno devincti credunt se extollere vestem, totius umorem saccatum corporis fundunt, cum Babylonica magnifico splendore rigantur*. [Boys often, when, having been overcome by sleep, they believe themselves to be lifting up their garment next to a basin or cut-down *dolia*, allow the liquid filtered from the whole of their body to gush out, soaking the Babylonian bedding in its wondrous brilliance.] A second passage in the literary sources, Varro *Saturae* [*Menippeae* 199.165], may also refer to the use of vessels termed *dolia* as a urinal/urine

container: *propter eam porticum situm erat dolium* [close by that portico was placed a *dolium*]. There is reason to assume that the vessels referred to in these two passages were more likely jars of some sort rather than vessels of the kind that archaeologists refer to as *dolia*. First, because vessels of the latter kind were exceedingly large, it would have been extremely difficult, if not effectively impossible, to carry them from the location where they were positioned as a urinal to some other location for emptying, and troublesome even to tip them so that the urine collected inside could be transvased to some more manageable vessel for a transfer of this kind. Second, unless vessels of this sort were cut down to well under one-half of their original size, set into a fairly deep pit, or provided with a step of some kind, their considerable height would have rendered them difficult or impossible to use as urinals.

Excavations at Benghazi [Berenike], in Libya, have produced what may be archaeological evidence for this practice. Here, the excavation of the alley defining the eastern side of *Insula* 7 uncovered a group of ca. fifteen locally manufactured cookpots placed in a rough line along the exterior wall of Building T at some point during that structure's first phase, which lasted from the last third of the first century to some point during the first half of the third century (Lloyd 1977: 150 fig. 30, 151–2, plate XIa) (Figure 7.4). Although a few of these vessels were either largely or completely intact at the time that they were uncovered, most were missing a substantial portion of their rim, neck, and/or upper wall. It is unclear whether any bore evidence of sooting. Some of the vessels were set into cuttings made in the compacted surface of the alley, whereas others were placed atop a layer of debris that had been allowed to collect on this surface. This indicates that they were not put in place all at one time, but rather in several discrete episodes extending over some considerable period of time. Although these containers may represent some sort of arrangement created for the purpose of collecting rainwater running off of Building T's eaves, Lloyd, the excavator, rejected this idea, suggesting instead that they served as urinals, with the narrowness of the alley affording users some degree of privacy.

7.2.4 / *Reuse as an Ossuary*

There is abundant archaeological evidence that in several parts of the Roman world vessels ostensibly manufactured as cookpots were employed as ossuaries. Whether this involved the reuse of vessels that had been employed for cooking or the initial use of newly manufactured vessels is not clear, although it should be possible to clarify this point by undertaking a systematic



FIGURE 7.4. Locally manufactured cookpots in alley to east of *Insula* 7 at Benghazi that perhaps were employed as urinals. Lloyd 1977: plate XIa.

examination of these vessels with a view to establishing the presence or absence of soot deposits of the kind typically produced when a ceramic vessel is placed over or beside a fire. Whereas in most cases this application appears to have involved no physical modification to the vessel, as was apparently the case, for example, in Tomb 128bis at the Portorecanati necropolis (Figure 6.12), described in Section 6.11, in some instances the vessels employed in this way were provided with a lead lining or covering. Three good examples of this practice are known from the Dragoncello necropolis, situated at mile 12 of the Via Ostiensis, near Ostia. Burial 125, from Building 9, of first-century date, involved the use of what appears to be a cookware *olla*, only partially preserved at the time of its recovery, provided with a lead lining, along with its *operculum* [lid] (AAVV 2001a: 443 no. XVI.11) (Figure 7.5). The lid had had its knob removed, and a small lead libation tube was inserted through the resulting hole. Burial 137, dating to the first century B.C. or the first century A.D., also involved the use of what appears to be a cookware *olla* provided with a lead lining (AAVV 2001a: 445



FIGURE 7.5. Cookware *olla* with lead lining and lid employed as ossuary at Dragoncello necropolis, near Ostia. AAVV 2001a:443.

no. XVI.18). Last, Burial 160, also of first-century date, involved the use of a medium-sized closed container of some sort in a coarse fabric, probably a cookware *olla*, together with its lid, both of which were provided with lead coverings on their exteriors (AAVV 2001a: 446 no. XVI.19). The provision of *ollae* intended for use as ossuaries with lead linings may have been undertaken by the same individuals who carried out the hole and clamp repairs sometimes made to tableware vessels, as discussed in Section 8.4.7.

7.2.5 / *Reuse as a Grinding/Polishing or Cutting Implement*

Sherds belonging to the categories under consideration occasionally display wear indicating that they were employed for some sort of grinding or polishing operation. At the Palatine East, for example, a sherd consisting of the proximate end of the long, straight handle from a Hayes Form 45 bowl in African *Sigillata* C displays a highly worn and faceted fracture surface that appears to have been produced by the protracted rubbing of the broken end of the handle against some other object (Figure 7.6).⁸

Due to the combination of a fine fabric and a high firing temperature, the sherds belonging to some of the classes subsumed under the categories under consideration tend to display notably sharp breaks, raising the possibility that they were employed for cutting operations of various kinds. Pliny *Naturalis historia* 35.46.165 provides anecdotal evidence for this practice, referring to the use of sherds to amputate body parts, including the use of a *testa Samia* [sherd of Samian pottery] by the *Galli*, the eunuch priests for the Magna

Mater, to castrate themselves, and a proposal to employ a sherd to cut out the tongue of a person found guilty of a serious crime.

7.2.6 / *Reuse as an Amphora Stopper or Token*

Sherds belonging to the functional categories under consideration were sometimes fashioned into disks, presumably to serve as *amphora* stoppers or tokens. For example, as indicated in Section 6.17, the groups of sherd disks recovered at both the Palatine East and the Avenue du President Habib Bourguiba site at Carthage contained substantial numbers of these items that had been fabricated from cookware, tableware, and utilitarian ware sherds. The fact that disks fashioned from the various classes of gloss-slipped tableware would have had a bright finish on one or both of their faces suggests that a relatively high proportion of these were manufactured to serve as tokens or gaming pieces rather than as *amphora* stoppers. This assumption is supported by the relatively small size of these disks overall compared with those manufactured from sherds belonging to the other functional categories, and the fact that in some instances these were fashioned in such a way as to retain an element of relief decoration such as a mask on one of their faces (Marsh 1981: 229; Ward 1993: 20).

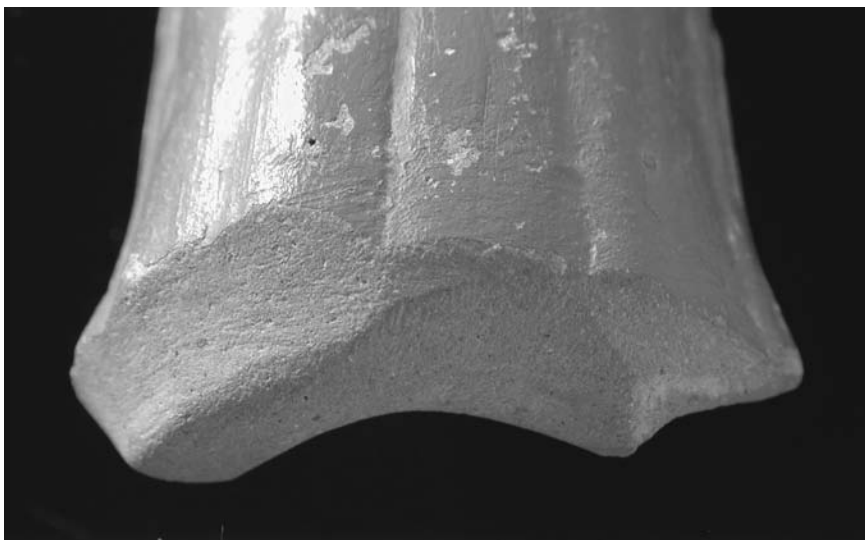


FIGURE 7.6. Portion of handle of Hayes 45 bowl in African *Sigillata* C with wear at end, presumably from reuse for polishing, from Palatine East. Photo: JTP.

7.2.7 / *Reuse as a Weight*

Sherds belonging to the functional categories under consideration were sometimes fashioned into disks and then pierced by a hole at their center, presumably to serve as weights of some kind. For example, as discussed in Section 6.19, the small group of sherd disks pierced by a central hole from the Avenue du President Habib Bourguiba site included examples fabricated from tableware and utilitarian ware sherds.

Marsh reports the recovery at London of sherds consisting of the lower portion of a Gallic *Sigillata* vessel that had been cut down to a point just above the ring foot and had a hole drilled through the center of the floor, speculating that these might have had a stick inserted through the hole and been used as tops (Marsh 1981: 229).

Sherds worked into a variety of shapes pierced by one or more holes, which might have served for a variety of purposes, are occasional finds on Roman sites. The excavations at Wadi Umm Hussein, for example, recovered a small (ca. 1.5-cm-diameter) sherd disk pierced by a hole near one edge which might have been used as a pendant (Tomber 2006: 295 no. 39, 298 fig. 4.6.39), portions of what appear to have been considerably larger (ca. 12- to 15-cm-diameter) sherd disks, one pierced by at least five (and probably ca. eight) evenly spaced holes near its edge, and the other pierced by a hole at its center and at least five (and perhaps as many as 20) evenly spaced holes near its edge, which served some unknown function or functions (Tomber 2006: 297 nos. 42–3, 298 fig. 4.6.42–3), and a sherd cut into the shape of a hexagon or six-pointed star pierced by a large hole at its center that might have been employed as an element in inlay decoration of some kind (Tomber 2006: 299 no. 51 fig. 4.7.51).

7.2.8 / *Reuse as an Ostrakon*

Although, as discussed in Section 6.20, the vast majority of *ostraca* appear to have been produced from *amphora* sherds, in some cases sherds deriving from vessels belonging to one of the functional categories under consideration were utilized for this purpose. Cribiore, for example, publishes a photograph of an *ostrakon* of unknown provenance, though presumably from Egypt, produced using roughly one-half of the base and lower wall of a small vessel with a low ring foot, probably a bowl or plate (Cribiore 1996: 200 no. 115, plate XIII.13 [= *O.Theb.* iv 48]). The text, a school exercise, is dated to the fourth to sixth century.

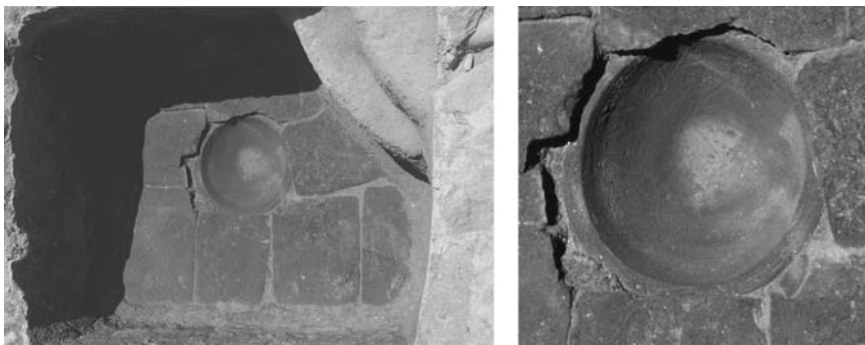


FIGURE 7.7. Flanged basin employed as sediment trap in basin at Piammiano. Photo: JTP.

7.2.9 / *Reuse as a Sediment Trap*

The lower portions of flanged basins or *mortaria* were on occasion employed as sediment traps inside basin fixtures employed for craft, industrial, or food processing operations. An instance of this practice is attested at Piammiano, where a *mortarium* that was missing some portion of its flanged rim was set into the floor of a rectangular basin of unclear function measuring ca. 1.70 by 1.46 m (Figure 7.7).⁹ This fixture, of probable first-century date, was built of stone rubble set in mortar, with the floor paved with complete or largely complete flat bricks. The *mortarium* was first set in place, presumably in a mortar preparation of some sort, and the brick paving then laid over the top, with a hole chiseled through the bricks to expose the central portion of the vessel, while leaving the remaining portion of the flange partially covered. The extensive abrasion present in the vessel's floor indicates that this application represented its reuse rather than its initial use.

7.2.10 / *Reuse as a Decorative Inset*

According to Ballardini, chunks of masonry fallen from the façades of some of the *insulae* [apartment buildings] at Ostia contained both green-glazed vessels and vessels that he alternately termed “*coppe arretine*” and “*coralline*” inserted into their plaster finishing (Ballardini 1964: 31–2, 52, 108), apparently in a decorative application similar to the medieval practice attested in some parts of Italy of inserting polychrome maiolica *bacini* into the façades of churches. He published a photograph of one such piece of masonry that contained two vessels embedded in its surface (Figure 7.8). Unfortunately,



FIGURE 7.8. Fallen masonry from façade of apartment building at Ostia with decorative pottery insets. Ballardini 1964: 32 fig. 44.

neither the form of these vessels nor the class to which they belong can be deduced from this image. Given the probable second- or third-century date of this application, however, it seems likely that the green-glazed vessels employed in this way were examples of Glazed Fineware, a tableware produced in various parts of the Roman world, including the Rome/Ostia area, whereas the *coppe arretine/coralline* were examples of late Italian *Sigillata*, South Gallic *Sigillata*, or African *Sigillata A*.

8

Maintenance



This chapter considers the behavioral practice of maintenance. Because maintenance, like reuse, played an important role in governing the formation of the Roman pottery record, it is here subject to comprehensive and detailed treatment, as was reuse in Chapters 5–7. As defined in Chapter 1, maintenance entails the upkeep or repair of a vessel so that it can continue to perform some application.

The Romans carried out four distinct kinds of pottery maintenance operations. These included two upkeep operations – cleaning and resurfacing – and two repair operations – filling/patching and bracing. Cleaning entailed the removal of substances that had been incrustated onto or absorbed into a vessel's wall, resurfacing consisted of the renewal of a coating on the interior surface of a vessel, filling/patching consisted of the filling or sealing of cracks in a vessel or the covering or plugging of holes in a vessel, and bracing entailed the adding of one or more support elements to brace the parts of a cracked vessel and/or to reattach one or more pieces that had been broken away from a vessel. Whereas the two upkeep operations, cleaning and resurfacing, were carried out exclusively during prime use and reuse, the two repair operations, filling/patching and bracing, were undertaken in the context of the manufacture, distribution, prime use, and reuse parts of the pottery life cycle. When undertaken in the context of manufacture or distribution, repair operations were carried out with the aim of enabling a damaged vessel to perform its intended prime-use application. When carried out in the context of prime use or reuse, upkeep and repair operations were undertaken with a view to allowing a vessel to continue to perform the application for which it was being utilized. In either case, these operations had the effect of prolonging the period of time that a vessel remained in the systemic context.

The contexts in which the inhabitants of the Roman world undertook to carry out maintenance operations on their pottery are a point of considerable

interest, as the amount of investment that people make in the maintenance of an item is presumably related in a more or less direct fashion to the value that they assign to it. The choice to maintain or not to maintain a vessel, then, although to some extent governed by the limitations of the available technology, was also determined by the value that its owner or user (where this differed from the owner) attributed to it. Although the evidence is far from comprehensive, it is nonetheless adequate to demonstrate the existence of broad differences in the extent to which the various functional categories of vessels were subject to maintenance. Although there also may have been variations in the extent to which pottery was subjected to maintenance operations by period, locale, region, or socioeconomic group, the available evidence is too scanty to provide a clear picture of patterning along these lines.

As there is an unusually rich array of evidence relating specifically to the maintenance of *dolia*, this functional category is considered separately from the other functional categories.

8.1 / *The Maintenance of Dolia*

It should come as no surprise that there is a disproportionately large amount of evidence regarding the maintenance of *dolia*. In the first instance, as discussed in Sections 2.3 and 4.2.2, the acquisition of a *dolium* represented a very substantial outlay of funds, and the replacement of these vessels, on account of their very great size and weight, must have entailed considerable inconvenience. For these reasons it is logical to assume that considerable effort was expended on the maintenance of *dolia*. Further, because *dolia* often remained in use for extremely long periods of time, there was a considerable likelihood that they would become contaminated through the absorption into their walls of a portion of their content, leading to the spoilage of whatever foodstuffs might subsequently be placed in them. It would thus have been necessary to provide these vessels with a thorough cleaning on a more or less regular basis, and also to renew their interior surface coating from time to time. In addition, because *dolia* generally served as fixed receptacles, an example that was broken and then repaired could continue to serve in its original capacity with little or no effective reduction in its utility, provided that the repair rendered the vessel liquid-tight. This likely would have rendered the repair of a broken *dolium* a more reasonable proposition than would have been the repair of vessels belonging to the other functional categories.

8.1.1 / *The Cleaning of Dolia*

Passages in the Latin agronomists provide a modest amount of information regarding the methods employed for the cleaning of *dolia*. Cato (*De agri cultura* 152) recommends that *dolia* employed for the storage of wine be scrubbed with a rush broom in order to prevent dregs from adhering to the wall. Elsewhere (*De agri cultura* 2.3), he recommends the washing and pitching of *dolia* – presumably in this case meaning vessels employed for the storage of wine – as tasks appropriate for a rainy day. With regard to *dolia* employed for the storage of olive oil, Palladius (*Opus agriculturae* 1.20) advises that these be kept clean, lest, contaminated with rancidity stemming from old olive oil, they spoil the taste of any new oil placed inside them. Columella (*De re rustica* 12.52.14–15) describes a procedure that can be employed to clean an olive oil *dolium* in order to remove any dregs. He recommends that immediately after being emptied the vessel be cleaned twice with hot – though not overly hot – lye, rinsed repeatedly with warm water while being rubbed gently with the hands, and then dried with a sponge.

Ethnographic research has shown that practices generally similar to those prescribed by Columella and Cato have been employed for the cleaning of storage jars similar in size, form, and function to *dolia* during historically recent times in the Messenia district of Greece (Blitzer 1990: 690).

8.1.2 / *The Resurfacing of Dolia*

Dolia employed for the storage of wine were normally coated with a lining of pitch.¹ *Geoponica* (6.4) recommends that newly manufactured *píthoi* should be pitched immediately upon removal from the kiln, while advising that old (i.e., used) examples should receive this treatment at the time of the rising of the Dog Star (variously indicated in this work as occurring July 20 and July 24), noting that whereas some people elected to renew these vessels' pitch linings every year, others did so only every second year. In contrast, the *Menologium Rusticum Colotianum*, an inscribed altar of the first century from Rome (*CIL* 6.2305) that lists the various agricultural tasks associated with each of the twelve months of the year, indicates *dolea picantur* (*dolea* are pitched) for the month of September. That the pitch linings of *dolia* were renewed on a periodic basis is also supported by the previously noted statement by Cato (*De agri cultura* 2.3) to the effect that among the tasks suitable for a rainy day were the washing and pitching of *dolia*.

Columella (*De re rustica* 18.12.5–7) provides a detailed account of the methods employed for the pitching of *dolia*, describing two techniques, one

to be utilized for a *dolium demersum humi* [*dolium* sunk into the ground; i.e., a *dolium defossum*], the other for a free-standing *dolium*. The fact that he indicates that this task should be carried out forty days prior to the vintage and the fact that he considers the pitching of *dolia* already set into the ground makes clear that what he has in mind is not the initial coating of newly manufactured vessels, but rather the renewal of the lining of used containers. According to Columella, in the case of *dolia defossa*, the vessel to be lined is first heated by placing a torch inside it. Liquefied pitch is then poured into the vessel's bottom, the torch is removed, and a wooden ladle and iron scraper are employed to draw the pitch upward along the surface of the wall until it adheres. In the case of free-standing *dolia*, the vessel, after being left to heat for several days in the sun, is propped up in an inverted position on an arrangement of three stones and a fire built underneath its mouth. After the vessel has warmed to the point that its bottom is too hot to touch, it is set on its side on the ground and boiling-hot pitch poured inside. The vessel is then rolled around so that the pitch will coat the whole of its interior surface. Columella notes that the latter operation should be carried out on a day when there is no wind, as on windy days there is a risk that the fire will flare up while the vessel is being heated, causing it to break.

A panel in the Rustic Calendar Mosaic (also known as the Seasons Mosaic), a work dated to the first quarter of the third century from Saint-Romain-en-Gal, across the Rhône River from Vienne, portrays the pitching of a *dolium* presumably destined for the storage of wine by what appears to be the second of the two techniques described by Columella (White 1975: Pl. 15 c; Lancha 1981: 218 no. XXVI, pl. CXIX b) (Figure 8.1).² On the right-hand side of the scene a man is shown leaning over to his left in order to stir the contents of a shallow basin that is set atop a fire. On the left-hand side a second man is shown inserting a long-handled implement of some kind into a small *dolium* that is set on its side. The first man is presumably liquefying pitch, whereas the second is apparently using the implement that he holds either to maneuver the vessel into position to receive the pitch being prepared by the first man, or to distribute liquid pitch that has already been poured inside the vessel around its interior surface, either by rolling the vessel about on its side or by drawing pitch that has puddled in the lowest part up along its walls.

The interior surfaces of *dolia* employed for the storage of olive oil were normally coated with either wax or gum. According to Cato (*De agri cultura*



FIGURE 8.1. Panel depicting pitching of wine *dolium* from Rustic Calendar mosaic from Saint-Romain-en-Gal. Lancha 1981: pl. CXIX b.

69.1–2), to coat a new oil *dolium* one should first pretreat the vessel by filling it with *amurca* [olive oil lees], leaving this to sit for seven days, then decanting the lees and drying the container.³ One then heats the vessel and rubs its surface with *cummi* [gum] dissolved in water. Because oil *dolia* likely remained in use for extremely long periods of time, there would have been a need to renew these linings on a periodic basis. Columella (*De re rustica* 12.51.15–17) provides instructions for this procedure. As indicated in the previous section, he indicates that the vessel should first be cleaned by washing with lye, rubbing with the hand, and then drying. The walls of the vessel then receive a coating of liquid gum.⁴ Interestingly, Columella notes that in earlier times the practice had been to coat olive oil *dolia* with beeswax, but that this was no longer done in his day, because, once a vessel had absorbed oil into its wall, wax would no longer adhere, meaning that coatings of this kind could not be renewed.

8.1.3 / *The Repair of Dolia*

The repair of *dolia* often involved a combination of both filling and bracing operations, and for this reason these two forms of repair are here considered

together. There are three passages in the Roman literary sources concerning the repair of *dolia*. The most informative of these is Cato *De agri cultura* 39.1:

Dolia plumbo vincito vel materie querneae vere sicca alligato. Si bene sarseris aut bene allegaveris et in rimas medicamentum indideris beneque picaveris, quodvis dolium vinarium facere poteris. Medicamentum in dolium hoc modo facito: cerae P. I, resinae P. I, sulphuris P. C' C'. Haec omnia in calicem novum indito, eo addito gypsum contritum, uti crassitudo fiat quasi emplastrum, eo dolia sarcito. Ubi sarseris, qui colorem eundem facias, cretae crudae partes duas, calcis tertiam commisceto; inde laterculos facito, coquito in fornace, eum conterito idque inducito.

[Tie *dolia* with lead or bind them with oak that has been dried completely. If you mend well or bind well, working the *medicamentum* (repairing agent) into the cracks and doing a good pitching job, you can use any *dolium* for the storage of wine. Make the repairing agent for *dolia* as follows: one pound of beeswax, one pound of pine resin, and two-thirds of a pound of sulfur. Put these into a new vase, and then add ground gypsum until it reaches a consistency similar to that of plaster. Use this to mend *dolia*. To match the color of the area that you have mended to that of the vessel, mix two parts raw clay with a third part lime, form this into briquettes, bake in an oven, and then grind and apply.]

From this passage it can be inferred that for the repair of a cracked or broken wine *dolium* Cato envisages a procedure consisting of a sequence of four operations:

1. Bracing the vessel by means of elements of some sort fabricated either of lead or dried oak;
2. Filling the cracks with a compound consisting of a set ratio of wax, resin, and sulfur, and a variable amount of gypsum;
3. Matching the color of the repair to that of the vessel by coating the repaired area with a compound consisting of a set ratio of clay and lime that have been heated and then pulverized;
4. Pitching the interior surface of the vessel.

A considerable body of archaeological evidence, discussed below, elucidates the techniques employed to repair cracked or broken *dolia* by means of lead bracing elements as alluded to in this passage. Although there is no archaeological evidence either for the bracing of broken *dolia* with elements fashioned from wood or for the filling of cracks in *dolia* by means of

compounds such as that described by Cato, by considering the approaches employed by specialist pottery menders in Europe and North America during the early modern and modern periods for the repair of broken tableware vessels (Thornton 1998) it is possible to gain some insight into operations of the latter kind. The filling compounds employed by these craftsmen were generally composed of two distinct elements, a bulking agent (or filler) and an adhesive (or bonder). As their names imply, the first of these served to provide the mass required to physically fill a crack, whereas the second served to solidify the compound, to enhance its resistance to heat and/or liquids, and/or to ensure that the filling remained in place. Among the materials employed as fillers were lime plaster (calcium carbonate), gypsum (calcium sulfate), clay, ground ceramic, ground glass, steatite, lead, and iron filings (Thornton 1998: 12–13).⁵ The materials used as adhesives included animal glue, starch, gum arabic, gum tragacanth, colophony, pine resin, pitch, tar, shellac, linseed oil, and beeswax (Thornton 1998: 14–17).

With the exception of shellac, the various substances employed by early modern and modern pottery menders were known to the Romans and might have been employed by them to produce compounds that could be used for the filling of cracks in pottery. In the case of the filling compound described by Cato, it is evident that the mixture of wax, resin, and sulfur served as the adhesive component, whereas the gypsum functioned as the bulking agent. Worth noting is the fact that gypsum is particularly well suited for the filling of cracks in small objects, such as ceramics, because in contrast with other commonly used bulking agents, specifically lime plaster, it dries without experiencing significant shrinkage (Thornton 1998: 9). From Cato's description it is clear that the color-matching compound was meant to be applied over the filling compound (rather than mixed into it prior to application) in order either to render the repair less noticeable or to hide it completely. The two substances that he prescribes for this compound, lime and clay, were widely employed as coloring agents in the filling compounds employed for the filling of cracks in pottery during the early modern and modern periods (Thornton 1998: 13).

The second passage in the Roman literary sources pertaining to the repair of *dolia*, Juvenal *Satura* 14.308–10, is concerned with the stock figure of the Cynic who makes his home in a storage jar: *dolia nudi non ardent cynici; si fregeris, altera fiet cras domus, aut eadem plumbo commissa manebit*. [The *dolia* of the naked Cynic do not burn down. If you smash one, another house will be built on the morrow, or the exact same one will remain, fastened back

together with lead.] This passage thus provides only a very general reference to the practice of bracing broken *dolia* by means of lead elements of some kind.

In the third and final passage in the literary sources regarding the repair of *dolia*, Varro *De lingua Latina* 5.137, in the context of a discussion of *sirpi* [rushes], notes: *sic sirpata dolia quassa, cum alligata his, dicta* [thus, broken *dolia* are said to be *sirpata* when they have been bound with these (i.e., *sirpi*)]. This may refer to a practice akin to that of bracing broken *dolia* by means of elements fashioned from dried oak mentioned by Cato in the first passage. More likely than not, vegetal elements of this kind consisted of hoops or wrappings similar to barrel staves that passed completely around the circumference of the vessel, binding the pieces tightly together.

There is a considerable amount of archaeological evidence that sheds light on the methods employed for the repair of *dolia* in Italy during the period from the first to the third century. Most informative in this regard are the sets of *dolia defossa* preserved *in situ* at two *horrea* at Ostia that apparently served as special purpose facilities for the storage of wine and/or olive oil. The first of these, the Caseggiato dei Doli (*Regio 1, Insula 4, doorway 5*), was constructed in the A.D. 120s or 130s, extensively remodeled during the late second or early third century, and abandoned towards the middle of the third century (Pavolini 1983: 86; Paroli 1996: 255; Pavolini 2002: 343–4). The main storage room of this building contains thirty-six *dolia defossa*. These appear to have been installed in connection with the building's late-second-/early-third-century remodeling (Pavolini 2002: 326), and were thus in use for a period of ca. forty to seventy years. At least twelve – thus one-third of the total – show evidence for repair on their exposed portions, consisting of the exterior surface of the vessels shoulders and rims.⁶ Because many of the vessels are missing some or all of their shoulders/rims, it is possible that the number subjected to repair was, in fact, larger than this, perhaps substantially so. In every case, the repairs consist of some variation on what is here termed *the mortice and tenon technique*.⁷ This involved piecing the vessel back together (in cases where the vessel was broken, rather than simply cracked), cutting one or more slots, or mortices, into the exterior surface, each positioned to straddle a crack, and then fabricating a lead bracing element, or tenon, inside each of the mortices. The number and positioning of tenons were determined by the nature and extent of the damage to be repaired. Not uncommonly, lead filler was also introduced



FIGURE 8.2. *Dolium defossum* with horizontal crack repaired by means of mortice and tenon technique at Caseggiato dei Doli at Ostia. Photo: JTP.

into the cracks or breaks, presumably with a view to rendering the vessel liquid-tight. It was possible to employ this method for the mending of *dolia* due to the extraordinarily thickness of these vessels' walls, which normally falls in the range of 4–6 cm.

The repairs attested at the Caseggiato dei Doli can be divided into two basic types: those that involved the repair of damage in the form of cracks or breaks that had formed along lines of weakness determined by the methods employed for the forming, drying, and/or firing of the vessel, and those that involved the repair of other kinds of cracks or breaks. Cases of the first type are of two distinct kinds. In the first of these, the damage that precipitated the vessel's repair consisted wholly or primarily of a horizontal crack or break that ran along the shoulder. The vessel shown in Figure 8.2 represents a good example of a repair of this kind.⁸ In this instance, the repair was undertaken in order to brace, fill, and prevent the propagation of a horizontal crack that ran roughly one-fifth of the way around the vessel's circumference. The repair operation involved the fabrication of three tenons, one at the

right-hand end of the crack and two at its left-hand end, combined with the filling of the crack with lead. A short vertical crack running down to the large horizontal crack from the lower edge of the vessel's rim was also filled with lead. All but the upper portion of this latter filling has now been lost. All three of the tenons, as indeed all of the tenons employed in the repairs attested at this facility, have a double dovetail profile, with the narrow waist between the two dovetails positioned more or less atop the crack. Tenons of this kind would have been an effective means to hold the pieces to either side of the crack firmly in place, reducing the risk of lateral slippage after the repair had been completed. The rim of this vessel has been broken away over much of its circumference, including the portion situated immediately above the repair, leaving a flat, regular fracture surface. From the pattern of incrustations on the exterior surface of the vessel it is evident that this occurred subsequent to the vessel's excavation. The vessel also displays two short vertical cracks similar to the vertical crack that was filled with lead, one to either side of this crack. These were not filled, and appear to have formed subsequent to the vessel's repair, perhaps again subsequent to its excavation. From the highly regular pattern of cracks on this vessel it is evident that it was formed by means of the slab building technique, with the portion of the wall demarcated at the bottom by the crack that was the object of repair and at the top by the fracture surface left where the rim was detached composed of a row of small rectangular slabs, the sides of which are demarcated by the series of short vertical cracks.⁹ The repair of this vessel was thus necessitated by the opening up of a long horizontal crack along the line of a seam that lay at the bottom of the row of slabs that constituted the vessel's shoulder.

In the second kind of repair that was directed at the mending of cracks or breaks that formed as a result of the production process, the damage that precipitated the repair consisted of one or more vertical cracks that ran from the vessel's rim down to its shoulder. Repairs of this kind are best illustrated by the vessel shown in Figure 8.3.¹⁰ In this instance, the damage that necessitated the repair of the vessel consisted of two vertical cracks that extended from points on the inner edge of the rim very nearly opposite one another down onto the vessel's shoulder. The repair was undertaken to brace, fill, and check the propagation of these two cracks. In both cases this involved the fabrication of two double-dovetail tenons – one situated roughly at the midpoint of the broad, flat, upper surface of the rim, and the other on the shoulder, a short distance above the lower end of the crack – and



FIGURE 8.3. *Dolium defossum* with two vertical cracks repaired by means of mortice and tenon technique at Caseggiato dei Doli. Photo: JTP.

the filling of the entire length of the crack with lead. The positioning and configuration of the two cracks indicate that they were the result of tensions deriving from the overly rapid shrinkage of the rim at some point during the production process. This might have occurred either during the drying phase, when the rim may lose water more rapidly than the rest of the vessel due to its more exposed position, or at the conclusion of the firing phase, when the rim may cool more rapidly than the rest of the vessel, again due to its more exposed position. In either case, this may lead to the formation of either cracks or weak spots that run downward from the vessel's rim (Rye 1981: 66 fig. 46a, 114, 115 fig. 101a).

In some instances the tenons and/or filler associated with these two types of repairs have been wholly or partially stripped from the mortices and channels in which they were seated, making it possible to reconstruct the techniques employed to produce them (Figure 8.4). The damaged area was first prepared, presumably by cutting it with a chisel. This involved reworking the crack to produce a more regular channel and then cutting



FIGURE 8.4. Detail of mortice and tenon technique repair to *dolium defossum* at Caseggiate dei Doli. Double-dovetail tenon and fill, with fill above tenon stripped away, showing reworking of crack into V-shaped channel. One Euro coin (diameter 2.4 cm) used to indicate scale. Photo JTP.

double-dovetail mortices for as many tenons as were required, positioning the waist of each athwart the channel. The reworking of cracks involved broadening and deepening their outer portion into a regular, V-shaped cut ca. 2–3 cm wide and 2–3 cm deep. Mortices appear to have been cut to only a shallow depth, generally no more than ca. 1 cm. Lead – either molten or in the form of a putty – was then introduced into the channel in order to fill it and into the mortice in order to form the tenon, apparently in a single operation. In at least some cases the lead introduced into the channel passed beyond the bottom of the V-shaped cut, filling the narrower, unregularized part of the crack and reaching the vessel's interior surface. Following the fabrication of the lead elements a chisel was used to produce a series of oblique cuts over their exposed surfaces. The aim of this operation was to force the lead firmly into place in order to achieve a tight fit. Once the lead

had solidified, the filler in the channel provided a liquid-tight seal, while the tenons held the parts of the vessel to either side of the channel firmly in place.

As noted above, some of the repairs to the *dolia defossa* in this building involved the mending of cracks or breaks that are unrelated to the production process. The vessel shown in Figure 8.5 is a good example of this kind of repair.¹¹ In this case, the repair was undertaken in order to brace and stop the propagation of a diagonal crack on the vessel's shoulder and to partially fill a second diagonal crack that crossed the first crack to form a rough X. The repair to the first of the two cracks involved the fabrication of at least four double-dovetail tenons without any modification to or filling of the crack. The repair of the second crack involved only the filling of the portion of the fissure situated immediately below the point where the two cracks crossed. Whether this entailed the reworking of the crack in this area is unclear. The highest of the four tenons, now missing, lay directly on line with the fill in the second crack, whereas the upper part of the next highest of the tenons passes directly over the upper arm of the second crack. From this evidence



FIGURE 8.5. *Dolium defossum* with two irregular cracks repaired by means of mortice and tenon technique at Caseggiato dei Doli. One Euro coin (diameter 2.4 cm) used to indicate scale. Photo JTP.

it appears likely that the repairs to this vessel were earlier carried out at two different points in time. Most likely, the first crack formed and was duly repaired by the fabrication of four or more tenons. At some later moment the second crack formed, perhaps due in part to damage resulting from the repair of the first, and was repaired by being partially sealed with lead filler.¹²

The nature of the material employed for these repairs and the method used to introduce it into the mortices and channels both remain uncertain. The material may have been lead, a lead–tin alloy, or a putty-like compound consisting of white lead (i.e., the mineral cerussite, lead carbonate) mixed with linseed oil (Rosenfeld 1965: 139–41; Thornton 1998: 11). The advantage of using a lead–tin alloy rather than lead would have lain in the fact that the former material has a significantly lower melting temperature.¹³ With either of these substances, however, it would have been necessary to heat the material to its melting point and then execute a pour into mortices and/or channels that had been oriented in such a way as to prevent the molten material from flowing out before it had cooled and solidified. Lead putty, in contrast, could have been worked at ambient temperature and pressed into tenons and channels regardless of their orientation, solidifying as the linseed oil evaporated. Given the fact that most of the repairs extend over large areas of the vessel's surface and the fact that at least some of the repairs may have been carried out with the vessel *in situ* in the floor of the building, it appears that it would have been extremely difficult, if not, indeed, impossible, to fabricate these elements by pouring molten lead or a lead–tin alloy. It thus seems likely that this part of the repair operation was accomplished by forcing lead putty into the mortices and channels.

The second of the two *horrea* at Ostia that provide information regarding the techniques employed for the repair of *dolia* is the Magazzino Annonario (Regio 5, *Insula* 11, doorway 5) (Pavolini 1983: 224). This facility, also constructed during the A.D. 120s or 130s, has a principal storage area that contains at least ninety-six *dolia defossa*.¹⁴ These containers have been subject to considerable damage since the time of their excavation, and most are now missing their rim and shoulder. Of the sixty-four vessels that can be inspected to some degree,¹⁵ only one bore a repair made by means of the mortice and tenon technique similar to those just described for the Casegiato dei Doli.¹⁶ However, because most of these containers were missing most or all of their rims and shoulders, the number that were repaired by means of this technique was almost certainly substantially larger than this.



FIGURE 8.6. Details of lead fillings on interior surface of *dolia defossa* at Magazzino Annonario at Ostia. Left: filling in long horizontal crack. Right: filling in short vertical crack. One Euro coin (diameter 2.4 cm) used to indicate scale. Photos: JTP.

Because so many of these vessels were missing their rims and shoulders it was possible to examine at least a small portion of their interior surface, as had not been the case with the better preserved *dolia defossa* at the Caseggiato dei Doli. Twelve of the *dolia* for which it was possible to examine some portion of their interior surface had a repair consisting of a short horizontal or a vertical crack filled with lead (Figure 8.6). These cracks were generally ca. 2–3 cm wide at their widest and often narrowed considerably towards either end. Those with a horizontal orientation were generally longer than those with a vertical orientation. In the single instance in which it was possible to inspect the corresponding area on the exterior surface of the vessel, it was evident that the crack did not pass completely through the vessel wall. In every case, the exposed surface of the lead filler was scored with a series of oblique cuts. The true number of vessels either still bearing or that once bore one or more repairs of this kind is apt to be larger, perhaps considerably so, as it was possible to gain a clear view of only the central portion of the interior surface of no more than a minor fraction of the overall number of the containers at this facility. The orientation of these repairs suggests either that these vessels were formed by means of the slab building technique, and that the repairs are fills introduced into cracks that opened up at the upper/lower margins and sides of slabs or, perhaps more likely, given the fact that the vertical cracks tend to be shorter than the horizontal

ones, that these vessels were formed by means of the coiling technique, and that these are fills introduced into cracks that opened up at the ends of coils and the junctions between adjacent coils. They were probably produced by forcing lead putty into the cracks and then working the exposed surface of the fill with a chisel in order to ensure a tight fit. Whether the cracks were reworked before the lead was introduced into them is unclear.

A third set of *dolia* that provides important information regarding the techniques employed to repair vessels belonging to this functional category is the group of containers recovered from the Diano Marina shipwreck (Parker 1992a: 163 no. 364). The ship, a merchantman that went down off the coast of Liguria in the middle years of the first century, contained fourteen *dolia* arranged in three rows along the line of the keel as fixed receptacles for wine. All fourteen of the *dolia*, some of which bore stamps suggesting that they were produced in the vicinity of Minturnae, a port in southern Lazio, bore lead repairs. Rando, who was responsible for the conservation of these containers, produced detailed descriptions of both the technique employed for their forming and that utilized for their repair (Rando 1996). They were formed by the slab building technique, with the rim added as a separate piece. The repairs were for the most part aimed at bracing, sealing, and/or stopping the propagation of cracks that opened up along the borders of slabs and along the juncture between the rim and the rest of the vessel. These repairs were of two types: double-dovetail tenons with lead filling in reworked cracks, more or less along the lines of the repairs attested at the Caseggiato dei Doli – although in at least one case on the interior surface of the vessel – and lead filling introduced into unreworked cracks, in at least one case from the exterior surface of the vessel.

Finds from other sites serve to illustrate variations on the repair techniques described above. A lead tenon recovered in an unstratified context at the late republican to mid-imperial villa at Posto, in northern Campania, which presumably served for the repair of a *dolium*, has straight sides rather than a double-dovetail configuration, suggesting that the slippage of joins was not in every case a concern (Cotton 1979: 82, no. 2, fig. 18.2). A repaired *dolium defossum* from a probable first-century context at the site of Piammiano illustrates a substantially more complex approach to the mortice and tenon technique (Figure 8.7).¹⁷ Only the lower ca. one-third of the vessel was found intact and *in situ*. This bears an extensive set of irregular cracks that were braced by a total of 14 tenons set into the vessel's interior surface. The mortices in which these were fabricated are straight-sided cuttings

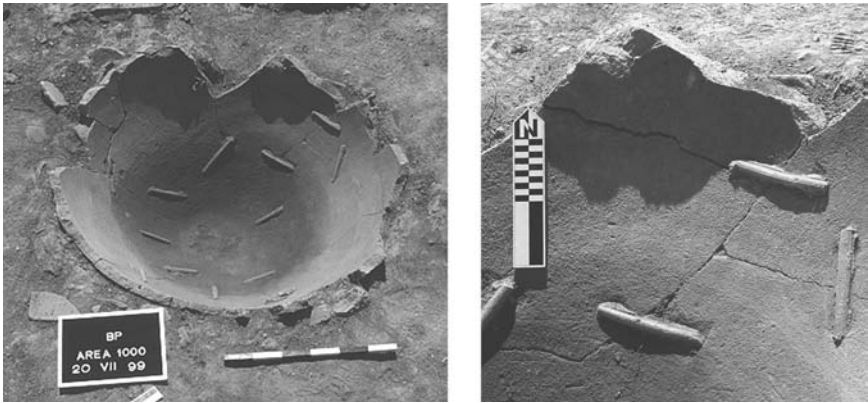


FIGURE 8.7. *Dolium defossum* with set of irregular cracks repaired by mortice and tenon technique at Piammiano. Left: general view. Right: detail. Photos: JTP.

ca. 2 cm wide, 15 to 20 cm long, and of unknown depth. The tenons consist of a cylindrical lead dowel set into a lead bedding. The dowels display striations on their surfaces parallel to their long axes, and several taper slightly toward one or both ends. In one instance the dowel has been pulled away from the lead bedding, revealing a circular hole in the bedding at one end of the mortice. This suggests that the dowels are, in fact, staple-shaped clamps that had their legs inserted into holes drilled through the vessel wall at either end of the mortice. If so, this repair would represent a combination of the mortice and tenon technique and the hole and clamp technique employed for the repair of tableware, described in the following section. On the basis of this evidence it appears that this repair was carried out while the vessel was interred in the cutting in which it was found. One may speculate that the mortices were produced by using a chisel to make an elongated cut in the interior wall of the vessel, and then a drill to cut a small hole the rest of the way through the wall at either end of this. A clamp was next fabricated for each of the mortices by extruding unsolidified lead through a circular opening, and then cutting and bending the resulting bar to measure for the particular mortice into which it was to be inserted. Lead bedding, presumably in the form of lead putty, was next introduced into the mortice, and the clamp then pressed down into this and its legs inserted into the holes at either end of the mortice before the bedding had solidified.

Dolium fragments with associated lead tenons and disassociated lead tenons have been recovered at villa sites throughout west central Italy,¹⁸ and it

appears that repaired *dolia* were fairly common at sites of this kind. By way of example, at the Villa Regina, outside Pompeii, three of the eighteen *dolia defossa* uncovered in the villa's *cella vinaria* had been repaired by means of what De Caro terms "*grappe fissate con piombo*" [clamps/tenons anchored with lead] (De Caro 1994: 68). Given the fact that these vessels did not reach the end of their normal use-life before being buried underneath volcanic ejecta in the eruption of August, A.D. 79, one should perhaps regard this as representing an atypically low proportion of repaired vessels for a facility of this kind.

The question arises as to when and where these repairs were carried out. Although it has generally been assumed that all such operations involved the repair of damage that occurred to a vessel during the use part of its life cycle, Rando has argued that it would have been extremely difficult, if not, indeed, impossible to effect repairs involving the extensive cutting of the wall of a *dolium* after it had been fired, and that repairs of this kind must therefore have been carried out prior to the vessel's firing, that is, during the manufacture part of its life cycle (Rando 1996). More specifically, he has posited that, due to the extremely thick walls of *dolia*, the drying phase of the production process not infrequently saw the formation of substantial cracks between the slabs and coils from which these vessels were built. In order to ensure that a vessel that had been damaged in this way could be rendered suitable for use as a storage container, the potters would have prepared it for a mortice-and-tenon repair while it was still in the leather-hard state, widening and deepening the cracks and cutting mortices in the appropriate places. After the vessel had been fired the potters would then have completed the repair, employing molten lead to fill the channels and fabricate the tenons.

The repairs described above for *dolia defossa* at the Caseggiato dei Doli, which involved both the mending of a horizontal crack on the shoulder of a vessel and the mending of a vertical crack on the rim and shoulder of a vessel, may well be examples of prefiring repair as envisaged by Rando. Further, the repairs described above for *dolia defossa* at the Magazzino Annonario, which involved the filling of relatively small cracks on the interior surface of a vessel, also appear likely to have been carried out as part of the manufacturing process. At the same time, it is clear both from literary sources (e.g., Cato *De agri cultura* 39.1) and from some of the examples of repaired *dolia* discussed above (e.g., the *dolium defossum* at the Caseggiato dei Doli with two oblique cracks; the *dolium defossum* at Piammiano) that repairs were sometimes undertaken to mend damage that occurred to these vessels during the use part of their life cycle. Repairs of this kind appear to have involved primarily the fabrication of tenons and to have entailed little if any

reworking of cracks and/or filling of these with lead. One may speculate that when repairs were being carried out for vessels that were damaged during use it was common practice either not to fill the cracks, or to fill them with a calcium-based compound such as that described by Cato, and that this material tends not to be preserved in archaeological specimens, or is difficult to discern in cases in which it is.

Although it is perhaps implicit in the passage from Cato regarding the repair of *dolia* that this task would have been undertaken by some member of the regular workforce at the estate where the vessel to be mended was located, the apparent frequency with which *dolia* were repaired in this way suggests that this operation eventually may have become the province of specialist craftsmen who worked as itinerants.¹⁹

From the passage in Cato regarding the repair of *dolia* it is clear that procedures of this kind were being undertaken in Italy from at least the middle decades of the second century B.C. The two passages that mention the use of vegetal binding elements for the repair of *dolia*, namely, those from Cato and Varro, are of republican date, raising the possibility that this was a practice that came to be superseded by the use of lead tenons by the first century. Because, however, vegetal elements of this kind would not normally be preserved, this apparent pattern may simply reflect the chronology of the available literary sources.

8.2 / *The Maintenance of the Functional Categories Other than Dolia*

There is relatively little evidence for the maintenance of the functional categories of pottery other than *dolia*, and these are here considered together. There are separate sections for each of the four maintenance operations identified at the beginning of the chapter (cleaning, resurfacing, filling/patching, bracing). As noted in Section 7.2.1, the practices of cutting down the rim and some portion of the wall of a vessel by sawing or chipping and the cutting of a notch in the rim and upper wall of a vessel, both attested with vessels belonging to certain of the functional categories here under consideration, should perhaps be considered forms of maintenance, as they may have been intended to render it possible for a damaged vessel to continue to perform the function for which it was being employed.

8.2.1 / *The Cleaning of Pottery Other Than Dolia*

The Latin, Greek, and Late Hebrew/Aramaic literary sources provide little useful information regarding the methods employed to clean the functional

categories of pottery under consideration. *Amphorae* were presumably cleaned before being employed for many of their more common reuse applications in order to remove absorbed wine, olive oil, and fish products residues, as well as incrustations consisting of the dregs of these substances that must have formed with a certain degree of frequency on the lower portion of their interior walls. Worth citing in this connection is *Tosephta* Nezikin Abodah Zara 4.10, discussed in Section 6.2.1, according to which, in order to render an *amphora* that had been employed by a gentile for the storage of wine clean according to Jewish law, it was necessary to fill it with water and let this stand for three days. Cookwares must have been cleaned on a regular basis in order to remove carbonized and uncarbonized food remains that adhered to the inner surface of the vessel after use, as well as any absorbed residues that might have imparted a bad taste to any food or drink prepared in the vessel.²⁰ This may have been accomplished by scrubbing these vessels with a stiff brush, a sponge, a piece of cloth, a handful of leaves, or the hand, perhaps with sand employed as an abrasive, followed by rinsing with water. Whatever the technique or techniques employed, these were not sufficiently abrasive to have left readily discernible scratch marks on the interior of Roman cooking vessels.²¹ One can also assume that many utilitarian ware and tableware vessels were at the very least rinsed out with water after use.²²

8.2.2 / *The Resurfacing of Pottery Other Than Dolia*

Although some classes of cookware were provided with a slip coating on their interior surface, presumably with a view to reducing the absorption of food residues into the vessel wall, most were not treated in this fashion. It seems reasonable to conjecture that certain vessels in the latter category were subjected to some sort of seasoning process that was repeated from time to time, although no evidence for any such practice survives in the literary sources.²³

8.2.3 / *The Filling/Patching of Pottery Other Than Dolia*

The shrinkage that pots undergo during both the drying and firing phases of the manufacturing process may result in the formation of more or less substantial cracks (Rye 1981: 65–6, 111–14; Rice 1987: 67–71, 104–7; Lungley 1999: 110–12). In some instances damage of this sort is fairly minor, and the vessel may be distributed to consumers as is. *Tosephta* Tohoroth Kelim Baba Kamma 2.6 provides evidence for this practice in the Roman world. This

passage is concerned with the problem of distinguishing between cracks that have formed in a vessel during the drying phase of the manufacturing process and those that have formed during its firing phase.²⁴ The ability to differentiate between the two was of importance to Jews, because cracks that formed during firing were judged to have occurred subsequent to a vessel's manufacture, and for this reason were held to render it unclean. The fact that a Jewish religious authority viewed it as worthwhile to address this question suggests that during the imperial period potters in at least some parts of the Roman world where there were communities of Jews marketed vessels that had cracked during the manufacturing process, and that buyers sometimes wished to employ these for the storage, preparation, and/or consumption of food and/or drink.²⁵

The cracks that form during manufacture are sometimes of a more substantial nature, and potters may seek to repair the vessel by introducing a filler into them, their aim being to consolidate the vessel, to render it liquid-tight, and/or to hide the defect from potential buyers. Of interest in this regard is the papyrus *P.Oxy. L 3595*, a contract for the rental of a pottery workshop by a potter at the village of Oxyrhynchus, in Egypt, dated to A.D. 243 (Cockle 1981). In this document, the lessee is obliged to sell the lessor a specified number of newly manufactured *kerámia* at an established price in lieu of rent payments. The contract requires that the containers should be well-fired and coated with pitch from their foot up to the rim, and that they should *χωρίς θεραπυσίνων καὶ [ἐ]πισιμῶν* [exclude any that are repaired or damaged] (lines 34–6). Although the document does not indicate the specific production defects and repairs envisaged, it is hard to imagine what these might have been, if not cracks that had formed during the drying and/or firing phase of manufacture and the filling of these. The fact that the contract included this provision suggests that the potters responsible for the manufacture of *amphorae* in the Oxyrhynchus area might normally be expected to repair containers that were damaged during the production process and to attempt to pass these vessels along to consumers.

The Palatine East pottery assemblage includes a vessel that represents a good example of this practice. The pot in question is an African Utilitarian Ware jug of probable fifth- or sixth-century date (Figure 8.8).²⁶ This highly unusual vessel bears three tall vertical spouts arranged side by side, with four strap handles that curve down from the spouts to the shoulder, one handle springing from either end of the row of spouts, and one from either side of the central spout. The interior surface of the shoulder shows that

FIGURE 8.8. Upper portion of African Utilitarian Ware jug with crack filled with calcium-based (?) compound from Palatine East. Photo: JTP.



whereas the spouts situated at either end of the row opened into the vessel's main chamber, the central spout opened into a separate inner chamber. The presence of this inner chamber suggests that this vessel was either a "puzzle jug" (i.e., a novelty vessel that obliged those who would pour or drink from it to divine from which of the three spouts the liquid would issue), or, perhaps less likely, given the presence of three, rather than just two spouts, a cooling vessel, in which cold water was placed in the main chamber in order to chill wine or some other liquid placed in the inner chamber.²⁷

The exterior of the vessel displays a crack that runs around the base of the central spout and continues up onto one of the side spouts, reaching a point roughly midway between the shoulder and the upper handle attachment. At the base of the central spout this crack passes completely through the wall to the vessel's interior surface. On the interior of the vessel there is a second crack in the area of the shoulder situated immediately below the spout that is cracked on the exterior. In all likelihood, these cracks formed during the drying and/or firing phase of the manufacturing process as the result of uneven shrinkage caused by the large number of elements that were

joined together in the vessel's shoulder area (i.e., three spouts, four handles, the main chamber, and the inner chamber).

Rendering this vessel of interest with regard to the topic at hand is the presence of a whitish substance that fills the exterior portion of the first of the two cracks just described, carrying over onto the adjacent part of the vessel's exterior surface (Figure 8.9). The color of this material suggests that it contains a significant calcium component. From the way in which this material covers and fills the crack it is clear that it was deliberately added to the vessel, and that it is not, for example, an incrustation of calcium carbonate that built up either during the period of the vessel's use or during that of its archaeological deposition. It thus appears that the vessel was subject to a repair that involved the introduction of a filling compound containing a calcareous bulking agent (presumably either lime plaster or gypsum) into the crack. Although this operation might have been carried out in the context of distribution or prime use, it seems likely that it occurred as part of the manufacturing process, with the potter attempting to repair the portion of the damage that was readily accessible on the vessel's exterior. Although the material in question is slightly lighter in color than the salt scum layer that covers the vessel's exterior surface, it is a reasonably close match, and it seems possible that the person who repaired the vessel did so in the hope that he or she would be able to hide this not inconsiderable production defect from potential buyers (either middlemen or consumers). If so, it appears that the person who repaired the vessel was successful, as it ultimately found its way from a workshop located somewhere in Tunisia to a refuse midden in Rome.

Ceramic vessels were also subject to damage in the form of holing in the context of prime use or reuse, and in some cases it was possible to

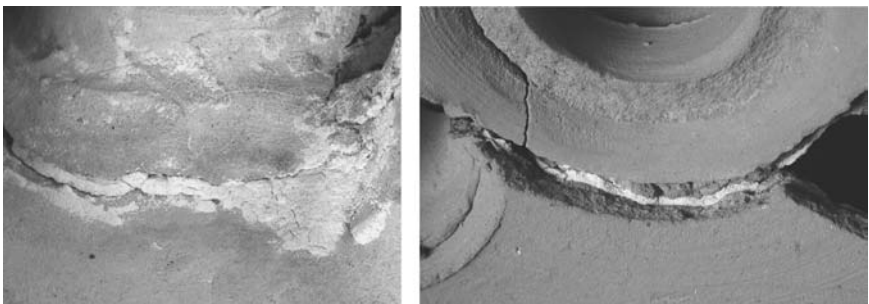


FIGURE 8.9. Details of African Utilitarian Ware jug depicted in Figure 8.8. Left: Filling compound in crack as it appears on exterior surface. Right: Filling compound in crack as it appears on interior surface. Photo: JTP.

repair a vessel damaged in this way by employing tar or bitumen either as an adhesive to glue one or more sherds back in their original position or as a filling agent to plug the hole. An Ecton Ware jar found in sediments of the River Nene near West Cotton provides a good example of the first of these two practices (Charters et al. 1993). The vessel in question suffered damage in the form of a roughly circular hole ca. 8 cm in diameter punched in the middle portion of its wall. The single sherd broken out of the wall was reinserted in position and held in place by a coating of tar derived from birch bark that was smeared over its inner surface and the adjacent area of the vessel's wall. The rabbinical sources provide evidence for the use of bitumen for the plugging of holes. *Mishnah* Tohoroth Kelim 3.3 and 3.8, for example, both refer to a *chabit* with a hole in it that has been repaired with פֶּתֶחַ [zepheth; bitumen], whereas *Mishnah* Tohoroth Kelim 3.7 refers to a קִוּמְקוּם [kumkum; a cauldron for heating water] (Zevulun and Olenik 1979: 35) with a hole in it that has been repaired with this same substance. Syro-Palestine was the principal source of bitumen in the Roman world, and it may have been favored for repairs of this kind in this region. Whether bitumen was also employed for this purpose in other parts of the Roman world is not known. The Yasi Ada B shipwreck, described in Section 5.2, produced a Late Roman 1 *amphora* with a hole in its shoulder, the edge of which had been deliberately smoothed, that may perhaps have been repaired with a patch of bitumen or some other material (Van Alfen 1996: 202).

8.2.4 / *The Bracing of Pottery Other Than Dolia*

There is a modest amount of archaeological evidence pertaining to the repair of vessels belonging to the functional categories of pottery under consideration by means of bracing. The most common method employed for the bracing of vessels appears to have been what is here termed the *hole and clamp technique*. In some cases, however, vessels were repaired by means of the mortice and tenon technique, more or less along the lines of the approach employed for the repair of *dolia*, as described in Section 8.1.3, by a technique here termed the *hole and lace technique*, or by being pieced back together and consolidated with a bonding agent such as dung or clay. Table 8.1 presents a summary of information regarding the various instances of repair of Roman pottery by means of bracing that are known to the author. A comprehensive search of the literature with a view to identifying all published examples, an undertaking that lies beyond the scope of this study, would doubtless reveal numerous additional instances, expanding the evidence regarding the range

TABLE 8.1. Summary of Information Regarding Known Instances of Repair by Bracing to Vessels Belonging to the Functional Categories of Pottery Other Than *Dolia*

Provenience	Class/Form	No.	Date	Technique	Reference
Cookware					
One or more sites on Antonie Wall, Scotland	Black Burnished Ware	>1	mid 2nd century?	Hole and clamp and/or mortice and tenon	V. Swan, personal communication.
Cefn Graeanog, Wales	Black Burnished Ware	1	3rd–5th century	Hole and clamp and/or mortice and tenon	Marsh 1981: 227
Utilitarian Wares					
Silchester, England	<i>mortarium</i>	1	last third 1st century	Hole and clamp	(http://www.rdg.ac.uk/AcaDepts/la/silchester/publish/find_docs/sfo3-2906.php). Tomber 2006: 216 fig. 1.77 right
Wadi Umm Hussein, Egypt	Type 90 jar	1	ca. A.D. 80–220?	Hole and lace?	
Tableware (not gloss-slipped)					
Posto, Italy	closed vessel	1	Roman?	Hole and clamp	Cotton 1979: 82, no. 3, fig. 18.3
Wadi Umm Hussein, Egypt	Type 119 bowl	1	ca. A.D. 80–220?	Hole and lace	Tomber 2006: 216 fig. 1.77 left
Tableware (gloss-slipped)					
Piammiano, Italy	Black Gloss Ware, Morel 2272–4?	1	200–50 B.C.	Hole and clamp	Unpublished (author)
Botromagno, Italy	Gray Gloss Ware bowl	1	100–70 B.C.	Hole and clamp	Hayes 1994: 211 (38.P.868)
Cetamura, Italy	Italian <i>Stigillata</i> plate or bowl	1	30 B.C.–A.D. 100	Hole and clamp	Unpublished (author)
London, England	Gaulic <i>Stigillata</i> , including Dragendorff 27 and 38	137	A.D. 45–240	Hole and clamp and mortice and tenon	Marsh 1981: 227–8, 229; http://museumoflondon.org.uk/ceramics/pages/object.asp?obj_id=5998 (89.148/1)

(continued)

TABLE 8.1 (continued)

Provenience	Class/Form	No.	Date	Technique	Reference
Piercebridge, England	Galic <i>Sigillata</i> , including Dragendorff 33	74	A.D. 90–220	Hole and clamp and mortice and tenon	Ward 1993: 19
Wroxeter, England	Galic <i>Sigillata</i> , including Dragendorff 35	>1	A.D. 165–175	Hole and clamp	Atkinson 1942: 147, 173 plate 45 B1 ([E 960] Q. 1)
Gorhambury, England	Galic <i>Sigillata</i> , Dragendorff 44	1	2nd century	Hole and clamp	Neal, Wardell, and Hunn 1990: 183–4 (117)
Chester, England	Galic <i>Sigillata</i>	2	A.D. 150–200	Hole and clamp or mortice and tenon	Bulmer 1980: 89
Stonea, England	Central Gallic <i>Sigillata</i> , Dragendorff 37	1	A.D. 150–220	Hole and clamp	Johns 1996: 412 fig. 137, 413 (13)
Stonea, England	Central Gallic <i>Sigillata</i> , Dragendorff 37	1	A.D. 120–220	Hole and clamp	British Museum, Room 49, Case 7 (PRB ST 84 SF 691); http://www.ceramicstudies.me.uk/histx108.html
Britain	Galic <i>Sigillata</i>	2	2nd century?	Hole and clamp	Nöel Humé 2001: 15 fig. 23
Palatine East, Italy	African <i>Sigillata</i> D, Hayes 59A	1	A.D. 300–360	Hole and clamp	Unpublished (# 6565) (author)
Palatine East, Italy	African <i>Sigillata</i> D, Hayes 59A	1	A.D. 300–325	Hole and clamp	Unpublished (# 6566) (author)
Palatine East, Italy	African <i>Sigillata</i> D, Hayes 104B	1	After A.D. 500	Hole and clamp	Unpublished (# 5754) (author)
Unknown					
Site 888D (mouth of Mignone R.), Italy	Unknown		Unknown	Hole and clamp	Angioni 1990: 259, 261 tav. 336.2

of forms and classes for which repairs of this kind were carried out, variations in the techniques utilized, and the chronology and geography of these practices. Although it cannot be excluded that in some cases bracing repairs were carried out on vessels belonging to these functional categories either in the context of manufacture in order to make good a production defect or in the context of distribution in order to fix damage suffered during transport or storage, the labor-intensive nature of these repairs, when considered against the slight value that a newly manufactured vessel probably had to producers and distributors, suggests that the vast bulk of these operations, if not, indeed, virtually all of them, were carried out in the context of prime use.

The hole and clamp technique involved piecing the vessel back together (in cases where the vessel was broken, rather than simply cracked), drilling one or more pairs of holes through the wall, one to either side of the crack or break to be mended, and then anchoring the pieces in place by means of staple-shaped metal clamps whose legs were inserted into the holes. It appears that in the majority of cases these clamps were fabricated in lead, although in some instances they may have been manufactured in brass or iron.²⁸ The holes were presumably produced by means of a bow drill equipped with an iron bit.²⁹ In some cases a filler consisting of a substance other than lead may have been introduced into the crack in order to render it liquid-tight. The number and arrangement of clamps would have been determined by the nature and extent of the damage to be repaired. This technique is generally referred to in the English-language literature as “riveting” – the term employed for a somewhat similar technique widely utilized in the early modern and modern periods for the bracing of porcelain and other fine pottery – here termed the *riveting technique* – and the bracing elements as “rivets.” As discussed below, however, the technique employed in the Roman world differed from the riveting technique in certain important regards, and it thus seems desirable to refer to it by some other name. The term employed here – the hole and clamp technique – has the virtue of accurately indicating the technique’s two basic elements.

The evidence for the repair of vessels by the hole and clamp technique consists of sherds pierced by one or more holes, which in some rare instances also preserve all or a portion of the associated lead clamp or clamps. Rarely is more than a sherd or two of a vessel repaired in this fashion recovered, rendering it impossible to reconstruct the overall arrangement of clamps employed for the repair of the vessel in question and difficult to determine more generally the range of different vessel breakage patterns for which the Romans had recourse to this technique. It should also be noted that in

FIGURE 8.10. South
Gallic *Sigillata*
Dragendorff 35 dish
repaired by hole and
clamp technique from
Wroxeter. Atkinson
1942: plate 45B,1.



some cases a vessel may have been pierced by holes of this kind in order to accommodate a bracing element other than a lead, brass, or iron clamp, such as a lace consisting of a loop of brass, lead, or iron wire, leather, or plant fiber, or for a purpose other than repair, for example, to permit liquid or steam to escape, or to accommodate a leather thong or a loop of plant fiber, so that it could be hung for storage. The approach employed here will be to examine two specific vessels repaired by the hole and clamp technique that provide some idea of the range of breakage patterns for which this technique was employed, and then to examine two specific vessels repaired by means of this technique that provide some idea of variability in the techniques employed for the fabrication of individual sets of holes and clamps.

The first of the two vessels to be examined with a view to providing some idea of the range of breakage patterns for which the hole and clamp technique was employed comes from Wroxeter [Verocomium], in England. The vessel, about two-thirds of which was recovered in a context dated to the 160s, is a South Gallic *Sigillata* Dragendorff 35 dish (Atkinson 1942: 173 no. [E960] Q1). It is evident from a published photograph (Figure 8.10) that the damage that precipitated this vessel's repair consisted of a single break that ran nearly straight down the wall from the rim to the floor, across the floor just slightly off center, and then nearly straight up the wall on the opposite side to the rim, splitting the vessel into two nearly equal pieces. The repair operation involved the fabrication of five sets of holes and clamps – one immediately below the rim at either end of the break, one roughly halfway

down the wall on each side, and one in the middle of the floor. Two of the clamps – the one in the middle of the floor and one of those halfway down the wall – were still in place at the time of the vessel's excavation. Interestingly, a Dragendorff 37 bowl in Central Gallic *Sigillata* recovered virtually intact in an early third-century midden deposit at Stonea, also in England, displays a similar break repaired by means of a nearly identical arrangement of five holes and clamps.³⁰ In light of the evidence provided by these two vessels it seems not unreasonable to suggest that the hole and clamp technique was regularly employed for the repair of simple breaks of the kind that they embody, with instances of this kind involving simple, straightforward arrangements of holes and clamps such as the five attested with these two vessels.³¹ In circumstances of this kind it seems possible that the repaired vessel was able to function more or less as it had prior to being broken.

The second of the two vessels to be examined with a view to providing some idea of the range of breakage patterns for which the hole and clamp technique was employed is a second Central Gallic *Sigillata* Dragendorff 37 from Stonea. In this case, six sherds – five of them joining – that preserve a minor portion of the rim and upper wall of the vessel were recovered in a context dating to the early third century (Johns 1996: 409, 412 fig. 137, 413 no. 13). From a published drawing (Figure 8.11) it is evident that the vessel to which the sherds belong was subject to a complex pattern of breakage that involved its shattering into numerous pieces – some quite small – and that its repair entailed the fabrication of a large number of lead clamps – the minor portion of the vessel represented preserves all or part of seven clamps and a hole cut to accommodate an eighth – in a highly complex and irregular arrangement. The repair of this vessel thus involved a complicated and

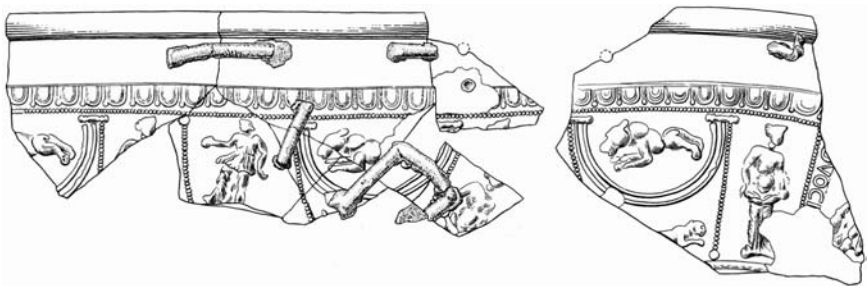


FIGURE 8.11. Drawing of six sherds (five joining) from a Central Gallic *Sigillata* Dragendorff 37 bowl repaired by hole and clamp technique from Stonea. Johns 1996: 412 fig. 137; © Trustees of the British Museum.

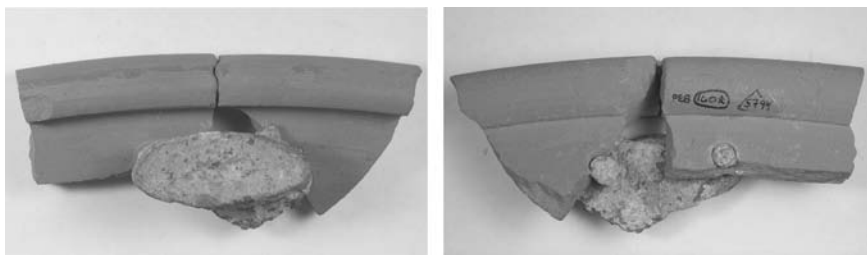


FIGURE 8.12. Two joining sherds from African *Sigillata* D Hayes 104B dish/bowl repaired by hole and clamp technique from Palatine East. Left: detail of exterior. Right: detail of interior. Photos: JTP.

time-consuming set of operations that must have resulted in a vessel that was substantially inferior to what it had been prior to breakage from both an esthetic and a practical point of view. The fact that the original owner or perhaps some new owner thought it worthwhile to resurrect this bowl from what must have been, in effect, a pile of sherds is a point of considerable interest, indicating that in some cases, at least, even extensively broken vessels were regarded as objects of significant value.

Turning now to variability in the techniques employed to fabricate individual sets of holes and clamps, the first of the two examples to be considered comes from the Palatine East excavations. This consists of two joining sherds preserving a small portion of the rim and upper wall of an African *Sigillata* D Hayes 104B dish/bowl (Figure 8.12).³² Although this form dates to the period ca. A.D. 500–600/620, the sherds in question were recovered as residuals in a context dating to the modern period. Each of the two sherds is pierced by a single hole, one of which retains the associated lead clamp. Although it is not possible to establish the pattern of breakage that precipitated the vessel's repair, it may have consisted of a simple rim-to-rim break similar to the one attested with the South Gallic *Sigillata* Dragendorff 35 from Wroxeter described earlier. The upper wall of the vessel, which is ca. 0.7 cm thick, bears two holes 0.5 cm in diameter lying 2.7 cm apart, ca. 1.3 cm to either side of the crack, and situated 0.9 cm below the bottom of the thickening on the exterior face of the rim. The edges of the two holes are beveled and somewhat irregular at the vessel's exterior surface, whereas they are sharp and regular at its interior surface. The clamp, which is made of ca. 65 gm of lead, consists of a large cross-piece that was held in place against the exterior surface of the vessel by two legs that passed through the holes to the vessel's interior surface. The cross-piece is ca. 1 cm thick,

with a flat exterior face and an oval profile with a long axis that measures ca. 4.0 cm and a short axis that measures 1.7 cm. It has a small, irregular flange projecting from its lower side at the point where it came into contact with the exterior surface of the vessel. The ends of the legs exposed at the vessel's interior surface display a flat, slightly hummocky surface. On one of the two legs this surface is scored by two short, parallel cuts.

On the basis of this evidence it is possible to reconstruct the set of operations employed to effect this repair as follows: Two holes were first drilled through the vessel wall, most likely from the interior surface. A mold with an oval cavity was then attached to the vessel's exterior surface in such a way as to cover the ends of the holes. The vessel was then oriented with the interior surface in an upward position and molten lead poured into one of the two holes from its open end at the vessel's interior surface. The lead flowed down through the hole into the cavity, with the displaced air escaping upward through the other hole. That the seal between the mold and the exterior surface of the vessel was imperfect is indicated by the fact that a small amount of molten metal escaped from the cavity, flowing a short distance outward and downward along the vessel's exterior surface before it solidified. The pour was continued until the molten lead had filled the cavity and risen back up through the two holes to a point roughly level with the vessel's interior surface. The lead was allowed to cool and solidify and the mold removed. The ends of the two legs exposed at the vessel's interior surface were then worked with a punch and, in one case, a chisel, forcing the lead outward against the sides of the holes in order to ensure that the clamp remained firmly in place.

The second of the two examples to be considered in order to illustrate variability in the techniques employed to fabricate individual sets of holes and clamps comes from Piammiano. This consists of a single sherd from a Black Gloss Ware plate/bowl – probably an example of the Morel Form 2272, 2273, or 2274 – pierced by two holes, both of which retain a portion of the associated lead clamp (Figure 8.13). Although the vessel probably dates to the second century or the first half of the first century B.C., the sherd was recovered in a plow-zone context.³³ It is evident that the pattern of breakage that precipitated the vessel's repair involved the formation of at least two cracks. One of these (henceforth referred to as *the vertical crack*) was a roughly vertical crack running down the wall from the rim. This now constitutes all or part of the left-hand edge of the sherd, when viewed from the vessel's exterior.³⁴ The other (here referred to as *the horizontal crack*) was

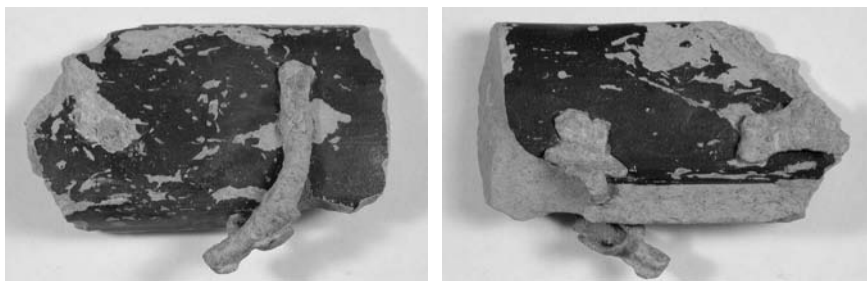


FIGURE 8.13. Sherd from Black Gloss Ware plate/bowl (probably Morel 2272, 2273, or 2274) repaired by hole and clamp technique from Piammiano. Left: detail of exterior. Right: detail of interior. Photos: JTP.

a roughly horizontal crack that followed more or less the line of the juncture of the vessel's lower wall with its floor. This now forms the lower edge of the sherd. These two cracks presumably met at the lower, left-hand corner of the sherd.

The wall of the vessel is pierced by two holes lying 2.6 cm apart ca. 1.8 cm below the rim and 1.0 cm above the juncture between the wall and floor. The hole to the left is 0.3–0.4 cm in diameter. Associated with this hole is a shallow groove chipped into the vessel's exterior surface. This consists of a cutting 0.5–0.6 cm wide that runs away from the hole in a 10 o'clock direction towards the vertical crack. The hole to the right is obscured by the remains of the associated lead clamp. It seems safe to assume, however, that it too had a diameter in the range 0.3–0.4 cm. There is also a groove associated with this hole. This consists of a shallow channel 0.5–0.6 cm wide that runs away from the hole in a 6 o'clock direction towards the horizontal crack. The wall of the vessel was presumably pierced by at least two additional holes, one situated further along the wall to the left of the position occupied by the sherd that accommodated the other leg of the clamp associated with the left-hand hole, and another situated in the floor below the position occupied by the sherd that accommodated the other leg of the clamp associated with the right-hand hole.

The right-hand hole preserves the associated lead clamp largely intact. This consists of a long, thin cross-piece held in place against the exterior surface of the vessel by a leg that passes through the hole to the vessel's interior surface. The cross-piece, which has an oval cross section, measures 7.6 cm long by 0.35 cm in maximum diameter. It originally had a vertical orientation, running from a point ca. 0.5 cm above the hole down the vessel wall to its junction with the floor, and then around this angle and along the exterior surface of the floor to a point slightly beyond the horizontal crack.

The portion of this element situated below the hole was seated in the groove associated with the right-hand hole. The lower ca. one-third of the cross-piece has been bent upward and to the left, perhaps in the course of the breakage episode that led to the vessel's discard. There is a small, curved lead plate attached to the cross-piece in a transverse direction ca. 0.7 cm from its lower end. From the size, shape, and position of this element it is evident that it was originally a flat plate seated inside the horizontal crack and that it was wrenched out of position and bent into a curved shape at the same time that the cross-piece was bent. Because the cross-piece was wrenched out of place at the time that it was bent, it is possible to examine the side that had been seated against the vessel's exterior surface. This bears a tiny longitudinal ridge corresponding to the groove in the vessel's exterior surface that extends beyond the point where the cross-piece traversed the horizontal crack.

The tip of the leg seated in the right-hand hole projects very slightly beyond the lip of the hole at the vessel's interior surface. Attached to the projecting end of this leg is a small, thin, irregularly shaped plate that lies flush with the vessel's interior surface. The rounded tip of the leg projects slightly above the plate, indicating that these are two distinct elements, with the latter produced only after the fabrication of the former. The plate extends downward from the lower edge of the tip of leg, following the vessel's surface as it makes the transition from the wall to the floor. It has three projecting lobes, one of which extends a short distance beyond the horizontal crack. It seems likely that this clamp had a second leg that passed through a hole cut through the floor of the vessel in a position below that occupied by the sherd in question, attaching to the cross piece at a point near its lower end. This was presumably broken away at the time that the cross-piece was bent.

The left-hand hole preserves substantially less of the associated clamp. This consists of a single leg with a small, irregular plate attached to the end exposed at the vessel's interior surface. This plate extends from the tip of the leg to the right (when viewing from the vessel's interior), reaching a point slightly beyond the vertical crack. There was presumably a cross-piece attached to the end of the leg at the vessel's exterior surface. This would have been seated in the groove associated with this hole, running up and to the left, extending to a point beyond the vertical crack. It seems likely that this was attached to a second leg that passed through a hole cut through the wall of the vessel in a position to the left of that occupied by the sherd.

The set of operations employed to effect this repair can be reconstructed as follows: At least two pairs of holes were first cut through the vessel wall,

presumably by drilling, one pair bracketing the horizontal crack, the other bracketing the vertical crack. Whether these were cut from the vessel's interior or exterior surface is unclear. Two shallow grooves were next chipped into the vessel's exterior surface connecting each of the two pairs of holes. A small amount of lead filler was then introduced into the horizontal crack at the point where this was traversed by the groove associated with the right-hand pair of holes. Additional lead filler may have been introduced into other sections of this or the vertical crack at this time. A clamp was then fashioned in association with each of the two pairs of holes. In the case of the clamp associated with the right-hand pair, this began with the fabrication of a cross-piece. This was probably accomplished by rolling a small amount of lead putty into a short piece of wire. Before this element had hardened it was set in place by being pressed into the groove that connected the two holes. This had the effect of producing a tiny ridge down the side of the cross-piece facing the vessel surface, and where this element came into contact with the lead filler that had been introduced into the horizontal crack the two became melded together. The clamp's legs were then fashioned by pouring a small amount of molten lead into the openings of the two holes on the vessel's interior surface. This was allowed to cool and solidify. A small plate was then added to the tip of one of the legs, and quite probably to both of them, where they emerged from the hole at the vessel's interior surface. This was likely accomplished by pressing of a small amount of lead putty onto the end of the leg and then flattening this against the vessel's surface, drawing the lead outward to a point slightly beyond the horizontal crack. When the plates had solidified they held the clamp firmly in place, while also bracing the repair from the vessel's inner side. The clamp associated with the left-hand pair of holes and any other clamps required to complete the repair were presumably fashioned by means of more or less this same set of procedures. The introduction of lead filler into the horizontal crack suggests that the repair was meant to yield a vessel that was liquid tight. As the small plates on the interior of the vessel lie nearly flush with its surface, the repair likely would not have interfered with the vessel's subsequent use. It cannot be excluded that the plates on the vessel's interior did not form part of the original repair but rather were added at some later time, when it became apparent that the original repair was inadequate, perhaps because the clamps had loosened with the vessel's ongoing use.

Although the two examples just described may capture something like the extremes involved in the fabrication of sets of holes and clamps with

regard to degree of complexity – with the first representing a straightforward operation entailing the drilling of holes followed by the casting of a clamp, and the second a far more complicated process involving the drilling of holes, the cutting of clamp seatings, the insertion of lead filler, and finally, the fabrication of clamps extending over both the exterior and the interior surface of the vessel from lead wire and molten lead – they do not represent the full array of different methods employed for this purpose. Marsh, for example, in briefly describing the methods employed for the bracing of Gallic *Sigillata* vessels in the collection of the Museum of London, indicates distinctly different practices, including the fabrication of clamps by passing lead wire through the holes, cutting the tips off the wire, and then hammering down the resulting ends (Marsh 1980: 227), and the supplementing of “rivets” by fitting a lead band around a vessel’s ring foot (Marsh 1981: 229).

Although the hole and clamp technique is in certain ways similar to the riveting technique utilized for the repair of porcelain tableware and other fine ceramics in early modern and modern Europe and North America (Parsons and Curl 1963: 27–99), it is important to note that it differs from this technique in certain important regards. In the riveting technique, a small string drill with a diamond-tipped spindle is first used to bore two holes ca. 1–3 mm in diameter partway through the vessel wall to either side of the crack to be mended. These are carefully cut so that they are angled slightly toward each other. A staple-shaped bracing element known as a rivet is next fashioned to measure from a segment of brass wire. The rivet is then installed by being snapped into place. This is accomplished by inserting one leg into one of the holes, grasping the cross-piece with a pair of pliers, tapping the other leg into the second hole with a small hammer, and then releasing the cross-piece. Rivets are generally positioned in such a way as to minimize their visibility; for example, they are placed on the underside of flat forms, such as plates or saucers, on the interior of lids, and so forth. When executed by a skilled practitioner, this technique yields an esthetically acceptable and liquid-tight repair that is able to withstand prolonged exposure both to hot contents, such as tea or soup, and to cleaning agents, such as hot water, detergents, and steam.

The tightness and durability of repairs executed by means of the riveting technique can be attributed to two factors. First, porcelain is a notably hard and fine-textured material that yields hard, regular breaks that are highly resistant to deterioration, and in which it is possible to drill small, precisely positioned holes robust enough to withstand the force exerted in

the insertion of a rivet. Second, because the rivets are snapped into place, they exert lateral compression on the crack, producing a tight fit, while obviating the need for the use of a filler. The earthenware fabric of even the highest-quality Roman pottery would have been considerably coarser and more friable than porcelain, and for this reason it seems unlikely that the riveting technique could have been employed with the same degree of success for the repair of Roman vessels. Although the lead bracing elements generally employed in the hole and clamp technique would have served to hold the fragments to either side of a crack in position, they would have exerted little, if any compressive force on the crack. This fact, together with the presence of substantially more irregular fracture surfaces to either side of the crack, would probably have required the use of a filler if the resulting repair was to be liquid-tight. Further, it seems likely that repairs executed by the hole and clamp technique would have been subject to significant deterioration with the passage of time, as the filler was gradually dissolved through repeated contact with liquids and abrasives, and as the lead bracing elements were deformed by the repeated applications of force that would have occurred with normal usage. It thus seems likely that repairs of Roman pottery effected by the hole and clamp technique yielded results that were substantially inferior to those obtained by the riveting technique with regard to the repaired vessel's ability to hold liquids without leaking and to remain useful for an extended period of continued use.³⁵

The degree to which a repair of this kind served to prolong the prime-use life of a vessel presumably varied considerably from case to case. Interesting in this connection is the evidence regarding the use-life of the first of the two Central Gallic *Sigillata* Dragendorff 37 bowls from Stonea described above. This vessel, although manufactured in the A.D. 120s or 130s, was recovered almost complete in a refuse deposit created some time after ca. A.D. 200, suggesting that it had a use life of at least ca. sixty years, and perhaps substantially longer.

As noted above, a small amount of evidence indicates that vessels belonging to the functional categories under consideration were also in some instances repaired by means of the mortice and tenon technique. Marsh, in describing the two methods employed for the repair of Gallic *Sigillata* vessels in the collection of the Museum of London, states that one of these involved making dovetail-shaped cuts in adjoining sherds followed by the insertion into these of "X-shaped rivets" (Marsh 1981: 227). He notes that this technique generally produced a more "untidy" result than the hole and clamp technique and that it was introduced later than this other method, becoming

more popular over the course of the second century. Similarly, Ward, in passing comments regarding the techniques employed for the repair of Gallic *Sigillata* from Piercebridge, makes reference to a technique that appears to represent some variant of the mortice and tenon technique, stating that a minority of the vessels in question were repaired by means of “dove-tailed rivetting,” as opposed to the hole and clamp technique, indicating that this technique occurs only with vessels manufactured after 150 (Ward 1993: 19).

In some very rare instances, vessels belonging to these functional categories were repaired by means of the hole and lace technique. This involved the drilling of one or more pairs of holes to either side of a crack to be mended, with a lace consisting of plant fiber, leather, or metal wire then passed through the holes, pulled taught, and tied off, securing the pieces in place.³⁶ The only certain example of this practice known to the author comes from Wadi Umm Hussein. In this case, two joining rim sherds from a Type 119 bowl that had been repaired by this technique were found with the lace still intact (Tomber 2006: 216 fig. 1.77 left). The repair involved the production of at least two pairs of holes, the first ca. 1 cm below the rim and the second ca. 2 cm below the first. A piece of what is termed “string” was then woven between the four holes in a crisscross pattern and covered with a sealant characterized as a “pitch-like substance.” How this element was tied off is not clear. A second pair of joining rim sherds from Wadi Umm Hussein, in this case belonging to a Type 90 jar, bears two pairs of holes ca. one-half cm in diameter drilled through the wall, one above the other, to either side of the crack, and presumably represents another example of repair by means of this technique (Tomber 2006: 216 fig. 11 right).³⁷

A cracked or broken vessel might also have been repaired by being provided with a coating of some substance which, once it had hardened, would have served to consolidate it. *Mishnah* Tohoroth Kelim 3.4, for example, refers both to a cracked *chabit* that was repaired by being plastered with dung and to a broken *chabit* that was repaired by being pieced back together, with potter’s clay employed as a temporary adhesive to hold the sherds in place, and then plastered with dung.

It is unclear when the practice of repairing pottery by means of the hole and clamp technique began in Italy. Several examples of Attic painted pottery of sixth- and fifth-century date bear repairs made by the hole and clamp technique, with the clamps in some instances fashioned in lead and in others in bronze (Connor 1996: 367–8). Some of these vessels were found in Italy, and the repairs that they bear were presumably produced there. Also worth noting in this connection is a bucchero *oinochoe* [jug] recovered in the

excavations at the Etruscan settlement of Acquarossa, in southern Etruria (*Architettura etrusca nel Viterbese: Ricerche svedesi a San Giovenale e Acquarossa 1956–1986*. 1986:114 fig. 109, 120 scheda 245). This piece, which presumably dates to the sixth century B.C., preserves the vessel's neck, shoulder, and vertical strap handle. The handle is pierced by a single hole that appears to have been produced with a drill. On the vessel's shoulder immediately below the hole in the handle is a second such hole. At the base of the handle, between the two holes and immediately below a break that detached the handle from the rest of the vessel, is a partially drilled hole. This was presumably begun, and then abandoned when the person carrying out the repair realized that it would not serve his or her purposes, presumably because it lay too close either to the break or to the handle attachment. The two completed holes no doubt served to hold a bracing-element of some kind, quite possibly a lead clamp consisting of an exterior cross piece and two legs.

Although the various instances of repair by means of bracing reported in Table 8.1 obviously represent only some minor portion of those known from the Roman world, they nonetheless permit some broad generalizations regarding the overall incidence, geography, and chronology of this practice. First, the data suggest that the repair of pottery by means of bracing was limited largely to high-end, primarily gloss-slipped tablewares. Indeed, to the author's knowledge, the literature contains references to only a few instances in which repairs of this kind were made to vessels belonging to a class other than some kind of gloss-slipped tableware. These include the repair of a closed vessel of undeterminable class from the villa at Posto by means of the hole and clamp technique, the repair of a *mortarium* from Silchester dating to the last third of the first century by means of the hole and clamp technique, the repair of an unknown number – though apparently at least two – examples of Black Burnished Ware 1 from Cefn Graeanog by means of an unspecified technique, the repair of Black Burnished Ware vessels from sites along the Antonine Wall in Scotland by means of an unknown technique, and the repair of a tableware vessel and perhaps also a utilitarian vessel from Wadi Umm Hussein by means of the hole and lace technique.

Even within the family of gloss-slipped tablewares, however, the repair of vessels by means of bracing appears to have been an uncommon practice. The 137 decorated Gallic *Sigillata* vessels (i.e., mold-made vessels with relief decoration) in the Museum of London collection that, according to Marsh, show evidence for repair by either the hole and clamp or the mortice and tenon technique represent 1.1% of the estimated 12,314 vessels of this kind in

the collection (Marsh 1981: 178, 227). Although this figure cannot be taken as a useful estimate of the total proportion of the molded Gallic *Sigillata* vessels in use at London during the period ca. A.D. 25–240 that were subject to repair by these techniques, inasmuch as there is a strong likelihood that it has been significantly conditioned by various sources of error, the effects of which remain impossible to determine (e.g., the possibility that some of the vessels in the collection were counted twice, the probability that some of the vessels in the collection that were repaired by one or the other of these techniques preserve no evidence for this due to their incomplete nature, a possible bias in favor of the retention by excavators of vessels displaying evidence for repair during the early period of the collection's formation), it does suggest that only a very minor portion of these vessels was subjected to an operation of this kind. Whatever the specific proportion of these vessels actually repaired by bracing, it seems likely that the figure was somewhat higher than that for undecorated Gallic *Sigillata* vessels on account of their more elaborate and distinctive nature and what one may assume was their somewhat elevated price.

In order to help contextualize the information regarding the incidence of repair to the vessels in question Marsh presents a graph with two curves, one representing the percentage of all mold-made Gallic *Sigillata* vessels in the Museum of London collection by production date by decade, the other representing the percentage of all mold-made Gallic *Sigillata* vessels in the collection displaying evidence of repair by production date by decade (Marsh 1981: 228 fig. 11.18). Although the two curves do not depart from one another dramatically at any point, the percentage values for repaired vessels are somewhat higher than those for all vessels for the period ca. A.D. 45–100, and somewhat lower than those for all vessels for the period ca. A.D. 100–170. Although one should not attribute too much significance to this pattern in light of both the probable sources of error noted above and the modest number of repaired vessels overall, these data do raise the possibility that at London the tendency to repair mold-made Gallic *Sigillata* vessels was somewhat greater during the earlier than it was during the later of these two periods.

Elsewhere, Ward reports that of the maximum of 5,543 Gallic *Sigillata* vessels in the pottery assemblage from Piercebridge, 74 vessels, or 1.3%, showed evidence for repair by means of either the hole and clamp technique or the mortice and tenon technique (Ward 1993: 19). Among these were several vessels displaying evidence that the operation was abandoned before being carried to completion in the form of partially drilled holes. As with

the figure for percentage of repaired mold-made Gallic *Sigillata* vessels from London, this value has presumably been conditioned by various sources of error, the effects of which are impossible to estimate (e.g., the probability that some of the vessels recovered that were subject to repair do not preserve any evidence of this due to their incomplete nature, and the virtual certainty that the overall number of vessels reported represents an overestimate of the true value). Although there are no data available that allow one to trace variation in the incidence of repair through time at Piercebridge, as Marsh was able to do for London, Ward does note that the proportion of repaired and worn Gallic *Sigillata* vessels is somewhat higher for contexts formed during the late second and early third centuries than for the preceding period (ca. A.D. 90 – mid-second century) (Ward 1993: 20–21).

At the Palatine East, of an estimated 1,451 vessels in the various classes of African *Sigillata* (A, A/D, C, C/E, and D) recovered in contexts dating from the last quarter of the first century to the second half of the fifth century, there are just one certain and two possible instances of vessels repaired by means of the hole and clamp technique, all examples of African *Sigillata* D. The certain instance is the Hayes 104B platter described above, whereas the two possible instances, consisting of sherds that bear a single drilled hole but no trace of a clamp, are examples of the Hayes 59A dish, produced during the period ca. A.D. 300/320–400/425.³⁸ These data suggest that at Rome the repair of high-end tablewares was a rare occurrence during the late imperial period and extremely rare prior to this.

The fact that the instances of repair by means of bracing reported in Table 8.1 are restricted almost entirely to Italy and Britain is presumably to some significant extent a function of the author's more limited familiarity with pottery assemblages and publications from other parts of the Roman world and of the tradition in Romano-British archaeology of producing detailed pottery reports, and it most certainly should not be taken as evidence that this practice was not also carried out in other parts of the Roman world. What can perhaps be said on the strength of this evidence is that the repair of gloss-slipped tableware vessels – for most part Central Gallic *Sigillata* – by means of bracing was a regular, if not common, practice across Roman Britain from the second half of the first to the first half of the third century, and that utilitarian ware vessels of nonlocal manufacture were also on some rare occasions repaired by this technique, with the latter practice perhaps limited for the most part to settlements situated at the margins of the Roman economic zone that enjoyed less regular or economical access to these classes of pottery. Although one might expect

that the repair of gloss-slipped tablewares was restricted principally to sites disadvantageously located with regard to the supply of Gallic *Sigillata* or that it became significantly more common during the third century, when there was a marked decrease in its supply throughout the whole of Britain, the sizable body of evidence from London does not lend support to either of these assumptions.³⁹ The only useful observations that can be made with regard to the Italian evidence is that the inhabitants of low-order settlements sometimes had recourse to this practice for the repair of gloss-slipped tablewares during the late republican and early imperial periods and that it was also sometimes employed at Rome for the repair of gloss-slipped tablewares during the late imperial period. In both cases this may reflect the fact that the supply of these wares was irregular and/or uneconomical. The fact that one or perhaps two vessels repaired by means of the hole and lace technique are known from Wadi Umm Hussein is not surprising, given its remote location and the difficulties that must have been involved in supplying pottery to the quarries in the Eastern Desert of Egypt.

The obvious conclusion is that the value of even high-end vessels was generally insufficient to warrant their repair. Perhaps contributing to this perception were the somewhat less than satisfactory results that could be obtained by means of the hole and clamp technique. It is instructive to compare this situation with that attested for Attic painted pottery, where, as noted above, numerous examples of repairs made by means of the hole and clamp technique are known, with the clamps manufactured in bronze rather than lead in several cases.

There is no evidence regarding the identity of the persons who undertook these repairs. The rarity with which pottery was repaired in this way, however, coupled with the fact that the technique does not appear to have required any narrowly task-specific skills, suggests that it need not have been the province of specialist craftsmen akin to the “china menders” of the early modern and modern periods (Thornton 1998: 6–7).⁴⁰ The operations involved, in fact, appear to be largely similar to those that would have been undertaken by tinkers, and it may be that in many times and places in the Roman world a single craftsman undertook the repair of vessels in both metal and ceramic.⁴¹ Interesting in this regard is the fact that at Piercebridge there was a concentration of repaired vessels from an area of the settlement that also produced an abundance of evidence for metal working, leading Ward to suggest that there may have been some relation between these two activities (Ward 1993: 20).

9

Recycling



This chapter considers the behavioral practice of recycling. As was the case with maintenance, because recycling played an important role in governing the formation of the Roman pottery record, it is here subject to comprehensive and detailed treatment. As defined in Chapter 1, recycling involves the use of a vessel or a vessel part as a raw material in a manufacturing process. Roman pottery was employed for various recycling applications at the termination of manufacture, distribution, prime use, and reuse. In addition, pottery could be reclaimed either from abandonment deposition or from an archaeological deposit for use in a recycling application. As noted in Chapter 1, a vessel or vessel part utilized in a recycling application loses its identity as a discrete artifact, and in this sense is removed from the systemic context.

The recycling of Roman pottery involved the use of sherds, crushed pottery, or pulverized pottery as a fill, fill/reagent, or tempering agent in the manufacture of a compound artifact. Among the various recycling applications attested are the use of sherds as fill in geotechnical and hydrogeological features, kilns, and concrete construction, as chinking in rubblework walls, and as a facing element in concrete construction and pavements; the use of crushed pottery as a fill/reagent in impermeable linings, wall/vault surfacings, and concrete pavements; and the use of pulverized pottery as a filler in mortar and wall plaster, as a tempering material in pottery, and as a flavoring agent or salve. After a discussion of certain technical considerations relating to the recycling of pottery, each of these applications is considered in turn.

9.1 / *Technical Considerations*

Several of the recycling applications for which Roman pottery was employed required either the crushing of vessels, vessel parts, and/or sherds to obtain sherds in roughly the pebble size range (ca. 0.4 to 6.5 cm), or the pulverizing of sherds to obtain ceramic material in the coarse sand-to-granule size range (ca. 0.05 to 0.4 cm) or smaller. Architectural ceramics (brick and

tile) destined for use in certain recycling applications were also treated in this fashion. In either case, the ceramic material obtained by crushing is generally referred to by Latin authors as *testae tunsae/tusae* [crushed ceramic fragments]. Vitruvius (*De architectura* 2.5.1) refers to fine-grained ceramic material, perhaps obtained by pulverizing, as *testa tunsae et succreta* [crushed and sieved ceramic fragments]. Palladius (*Opus agriculturae* 1.40) terms fine-grained ceramic material, again presumably obtained by pulverizing, as *testa minuta* [very small ceramic fragments]. Columella (*De re rustica* 6.14–17), finally, refers to pulverized brick as *pulvis lateritio trito* [dust from ground brick].

There is little direct evidence regarding the specific techniques employed to accomplish either the crushing or pulverizing of pottery in connection with recycling operations. Of considerable interest in this regard, however, is a passage in the *Geoponica* (7.24) describing a technique that could be employed to make new wine taste like old:

Ποίσεις δὲ παλαιοφανεῖς τοὺς οἶνους, ἔαν λαβὼν κεράμια δύο κοῦφρα ἀπὸ οἶνου παλαιοῦ, ἀφελὼν αὐτῶν τὰ ὦτα καὶ χεῖλη, καὶ τοῦ πυθμένος τὰ ἄκρα, τὰ μὴ μεταλαβόντα τοῦ οἶνου ἀπορρήμψης· τὸ δὲ ἄλλο ἔαν δεῖ σὺν τῇ παλαιᾷ τρυγί τοῦ οἶνου· κατεάξας τε καὶ σήσας ἔμβαλε εἰς ἕκαστον ἀμφορέα ἡμιμόδιον,

[You will make wines seem old if, taking two *kerámia* that have been emptied of old wine and detaching from them their handles and rim and the lowest parts of the bottom, which do not take on the flavor of the wine, you break up and sieve the rest, along with the old lees, if necessary, and you throw a half *modius* (of this) into each *amphora*.]

This passage rehearses what was likely a standard practice for obtaining pulverized ceramic material – breaking away the less useful extremities of an *amphora* such as the neck, the handles, and the spike – in this specific case less useful because they had not been exposed to the wine formerly held in the container, though in most other cases probably because they were relatively difficult to reduce to small sherds – and then crushing and sieving the remainder of the vessel.

Pompeii has produced a small amount of archaeological evidence that can perhaps be connected with pottery recycling operations. Jashemski in her reexcavation of the vineyard–restaurant that occupied the northwest portion of *Regio* 3, *Insula* 7 uncovered a sizable mound of sherds (Jashemski 1979:

232). This feature, which lay near the property's south enclosing wall, in the same general area as the *amphora* top reused as a brazier discussed in Section 6.13, included fragments of *amphorae* and various kinds of what Jashemski termed pots and pans. The small dimensions of the sherds led her to suggest that they had perhaps been crushed for use in the construction of pavements. Elsewhere at Pompeii, Sogliano reported small piles of construction material, including lime and "*mattone pesto*" (crushed brick) from the Casa del Vinario (Sogliano 1888: 515). Finally, the excavation of the Villa Regina, outside the town, produced a heap of *pozzolana* [volcanic ash], sherds, and ceiling stucco on the villa's drying floor that may perhaps represent materials intended for use in the remodeling work being carried out there at the time of Vesuvius' eruption (De Caro 1994: 62).

Elsewhere, Ward reports the recovery of a small, pyramid-shaped sherd of Gallic *Sigillata* in a medieval context at Piercebridge that may have been deliberately reduced by grinding, suggesting that this might have been undertaken for the purpose of obtaining pulverized ceramic material for some coloring, cosmetic, or medicinal application (Ward 1993: 20).

In lieu of any definitive evidence, it may be surmised that the crushing of sherds was accomplished by placing them on a hard surface of some kind and then pounding them with a hard, heavy object, such as a log or a piece of stone.¹ The pulverizing of sherds, on the other hand, was likely accomplished using either a stone *mortarium* or similar vessel and a stone pestle or a rotary quern, in some cases, perhaps generally, followed by sieving in order to remove the coarse fraction.² Evidence for this practice comes from a *villa rustica* excavated at Boccia al Mauro, ca. 6 km to the north of Pompeii, where a quern of unspecified type containing ground ceramic was recovered under the portico surrounding the *cella vinaria* (Cicirelli 1996: 168). It seems likely that this material was prepared for use as reagent/fill in mortar or plaster to be employed in connection with work being carried out to repair damage to the structure caused by the earthquake of A.D. 62. The suitability of sherds belonging to the various pottery classes for crushing or pulverizing would have varied considerably as a function of their degree of friability, and this attribute presumably played a significant role in determining the extent to which sherds belonging to each class were employed for certain recycling applications. One may conjecture, for example, that sherds deriving from Dressel 20 *amphorae* were poorly suited for many recycling applications on account of their extremely thick walls and notably hard fabric. The crushing of vessels and sherds for recycling presumably resulted in the production as

an incidental by-product of vessel parts that represented the most resistant portions of the vessel. In the case of *amphorae*, these presumably included handles, tops, bottoms, and spikes, with these last two parts a particularly common by-product in cases involving the reduction of containers that terminated in a solid spike. Indeed, it is not implausible to suggest that a substantial portion of the *amphora* parts employed in several of the reuse applications discussed in Chapter 6 were, in fact, residual materials resulting from the reduction of *amphorae* to sherds in connection with some recycling application.

Individuals, groups, or establishments that had need of substantial amounts of pottery for one or more recycling applications may well have obtained the material that they required by collecting it directly from individuals, groups, and establishments that generated refuse pottery, perhaps in the interest of efficiency concentrating their efforts on establishments that generated large quantities of refuse pottery on a regular basis, such as pottery workshops, facilities for the storage/distribution or sale of pottery, and facilities for the storage/distribution or sale of wine, oil, and/or fish products, establishing some sort of regular relationship with these. Alternatively, individuals or groups may have specialized in the collection of refuse pottery for sale to individuals, groups, or establishments who required it for use in one or more recycling applications. Martial (*Epigrammata* 1.41.3–5; 10.3.3–4) alludes to an arrangement of this kind that existed in his day at Rome for the collection of refuse glass for recycling that involved individuals whom he terms in one instance an *ambulator* [peddler] and in another a *proxeneta* [broker], who went door to door exchanging sulfur fire-starters for the remains of broken vessels. A significant amount of the refuse pottery that could have been obtained from pottery workshops would have consisted of overfired waster pottery. Because overfired pottery tends to be extremely hard, this material would have been relatively difficult to crush or pulverize, and may well have been avoided in the case of applications that required small pieces of ceramic material and/or ceramic material intended to serve as a reagent. Demolition and renovation projects such as the reroofing of a portion of a building also would have generated large amounts of used architectural ceramics that could have been employed for some recycling application. Construction crews could have retained this material for their own use or sold it to others who required substantial amounts of ceramic material for some recycling application. Substantial amounts of pottery suitable for use in recycling applications also could have been reclaimed from middens and

other discard contexts, particularly in cases where these regularly received refuse from establishments of the kinds just noted. The suitability of pottery obtained from discard contexts for recycling would have been conditioned to some extent by the degree to which it was mixed with other forms of refuse not suitable for use in the specific application for which the material was required.

9.2 / *Recycling as Fill in Geotechnical/Hydrogeological Features and Foundations*

Pottery was regularly employed as unconsolidated fill in geotechnical and hydrogeological features (sometimes, though not always, in association with *amphorae* and/or *amphora* parts as structuring elements) and in foundations for structures of various kinds. In each of these cases, sherds were likely employed, often together with other materials, such as construction debris, because these presumably were available in large quantities and at no cost other than the time and inconvenience involved in collecting them. In the case of hydrogeological features, sherds, because of their varying sizes, relatively low density, and generally curved shape, would have permitted the construction of loose, highly permeable fills of the sort needed to effect either the vertical or horizontal movement of water.

The Università Cattolica site in Milan, discussed in Section 6.27.2, presents good examples of the use of sherds as fill in foundation features. Specifically, *amphora* sherds were employed in bedding layers for the metalled roads that crossed the site, and, mixed with a bonder of clayey silt, in the construction of small rectangular foundations that may have supported pillars (Bruno 1998: 260).

9.3 / *Recycling as Fill in Structures at Pottery Workshops*

As already noted, pottery workshops would have generated large quantities of waster pottery, and from the evidence provided by the excavation of several such establishments, it is evident that this material was often recycled as fill in the various structures and fixtures built on the workshop premises. Particularly common was the use of waster pottery as fill in kilns, which in many cases were constructed in a fairly casual manner using large fragments of brick, tile, and whatever other material happened to be at hand, bonded with clay mortar.

A good example of this practice comes from the Black Gloss Ware workshop at Iesi [Aesis], described in detail in Section 10.3. The excavated portion of the workshop contained the remains of three small updraft kilns

with a circular firing chamber and a central support, all belonging to its second phase, dating to the period ca. 160–140 B.C. (Brecciaroli Taborelli 1998: 31–3). One of these, termed Fornace 2, had a combustion chamber 1.20 m in diameter that was dug into a natural layer of fluvial sediment. The cut was lined with courses of refractory brick ca. 8 cm thick bonded with clay mortar that were preserved to a maximum height of 0.56 m. The preserved portion of the combustion chamber was found filled with debris, including fragments of fired clay and other material that had apparently belonged to the kiln's superstructure. Among this material were more than 450 fragments of pottery, almost exclusively examples of Black Gloss Ware certainly or probably produced on the premises (Brecciaroli Taborelli 1998: 62). These sherds did not generally mend to form substantially complete vessels, and a large number had fired clay adhering to their surfaces, suggesting that they were fragments of vessels ruined by one form or another of production defect that had been collected on the workshop premises and incorporated into the structure of the kiln.

9.4 / *Recycling as Fill in Concrete Construction*

Pottery was occasionally recycled as fill in concrete construction.³ The Romans made extensive use of concrete for the construction of walls and various kinds of vaulted roofing. Roman concrete work, generally termed *opus caementicium*, was composed of three elements: mortar, fill, and facing. As discussed in Section 9.10, the mortar element was composed of lime and a filler, normally quartz sand or *pozzolana*. The fill usually consisted of cobble-sized fragments of stone, fragments of ceramic material, or gravel, collectively termed *caementa*. The facing was generally composed of more or less regularly dressed stone elements or brick and was usually intended to receive a surface rendering of either plaster or marble veneer.

Although the bulk of the ceramic material employed as fill in Roman concrete consisted of large fragments of brick and/or tile, fragments of pottery were also utilized for this purpose, and a careful examination of a concrete structure often reveals the occasional sherd. The sporadic nature of this material suggests that pottery was normally incorporated as fill in *opus caementicium* in a casual rather than a deliberate and systematic fashion.

The practice of including pottery as fill in Roman concrete has generally received little attention from archaeologists and architectural historians, save for the possibility that it sometimes offers of deriving dates for the different phases in a building's structural history due to the inclusion in its various elements of closely datable sherds (Van Deman 1912: 231). The utility of the

results that can be obtained from the careful analysis of the fill in concrete structures has been demonstrated by Pavolini and colleagues, who performed a systematic description of the fill materials included in the *opus caementicium* structures that belonged to an apartment building excavated in the Piazza Celimontana, on the Caelian Hill in Rome (Pavolini 1993: 329–44). Although Pavolini and colleagues were able to distinguish seven different subphases in the structures present on the site, covering a span of time running from the early first century to the fourth century, those belonging to just one subphase dated to the second or early third century were found to contain significant amounts of pottery fill (Pavolini 1993: 332 Periodo IV B). The fill employed in the walls of this subphase displayed a pronounced degree of heterogeneity in terms of the range of different materials represented, suggesting that it was collected in an adventitious manner, perhaps from dumps of construction refuse and/or domestic refuse middens. Although it will be necessary to carry out considerably more research of this kind before it is possible to draw any firm conclusions, this evidence suggests that pottery was not deliberately and systematically collected for use as fill in *opus caementicium* structures at Rome during the first four centuries A.D.⁴

The systematic use of pottery as fill in *opus caementicium* and related construction is not, however, entirely unattested. At the harbor at Cosa, for example, the upper portions of Piers 1, 2, and 3 were constructed in a variety of concrete distinct from that utilized for the lower portions of these elements, employing an aggregate consisting primarily of cobble-sized fragments of limestone and *amphora* sherds, the latter deriving predominantly from Dressel 1s (Gazda 1987: 77–8; McCann 2002: 22 figs. 43–5). *Amphorae* of this class were manufactured in the immediate vicinity of the harbor (Olmer and Vitali 2002: 465–6) and were also apparently filled with wine and also perhaps fish products at packaging facilities located somewhere in this same area. These operations would have generated substantial amounts of both waster pottery and regularly manufactured containers that were damaged in the course of filling, and it was presumably the ready availability of this material that lay behind the systematic use of *amphora* sherds as fill in these structures (McCann 1987: 325–6).⁵ In the case of Pier 2, the upper portion of which was produced in a series of at least four different pours, the limestone fragments and *amphora* sherds employed as fill were arranged in a regular fashion, with body sherds oriented with the curved side facing downward and the rims, handles, and spikes positioned horizontally. It is impossible to date this construction with any degree of certainty. Although the upper

portions of the piers might have been built as early as the late second or early first century B.C., it seems more likely that they were realized in the course of repairs carried out at some point during the first or second century A.D. (Gazda 1987: 97). If so, their construction would have involved the use of residual *amphora* sherds that were as much as two centuries old.

Elsewhere, Adam notes that in some cases repairs to walls made at Pompeii and Herculaneum following the earthquake of 62 involved the use of fill and/or facing consisting largely or entirely of fragments of pottery, chiefly *amphora* sherds, providing illustrations of instances from a house in *Regio* 9, *Insula* 6, doorway 3, at Pompeii, and the Casa a Graticcio (*Insula* 3, doorways 13–15) at Herculaneum (Adam 1994: 153, 154 figs. 364–5). He also publishes a photograph of *opus caementicium* with fill consisting of pottery and fragments of *pozzolana* that he identifies only as an arch in a tomb at the Isola Sacra necropolis (Adam 1994: 79 fig. 173). Worth noting is that each of these constructions was of a fairly small size and thus would have required the collection of only a modest amount of pottery for use as fill.

There were likely two reasons that pottery was not often employed as fill in concrete construction. First, DeLaine has shown that the amount of labor involved in laying the fill in the core of a concrete wall begins to rise significantly when the average size of the elements employed drops below ca. 300 cm³ (i.e., roughly fist-sized), and then rises sharply once this value drops below ca. 100 cm³ (DeLaine 2001: 238–9). She notes that elements in the sub-300 cm³ size range, which would have included most sherds, were generally avoided, presumably for this reason. Second, most specific applications of this kind would have required large quantities of material, and unless one had ready access to the refuse pottery generated by one of the various sorts of commercial establishments listed earlier, it would have been an extremely time-consuming undertaking to collect a quantity of pottery sufficient for the task.

Although pottery is also a common inclusion in both Roman mud-brick and *terre pisé*, there is, to the author's knowledge, no evidence that sherds were deliberately and systematically added to these as fill.⁶

9.5 / Recycling as a Construction Element in Rubblework Walls

Pottery was sometimes utilized as a construction element in rubblework walls. The House of Quintus Fulvius at Cosa provides a good example of this practice. Here, remodeling undertaken during the early first century B.C. involved the construction of a wall composed of chunks of limestone

set in lime mortar, with leveling courses consisting of fragments of tile and what are described as “storage-ware sherds” (Bruno and Scott 1993: 87–8). Also at Cosa, the rebuilding of a spring house in the port area during the second half of the first century A.D. involved the construction of a series of small columns for the support of an elevated conduit that were realized in alternating courses of *amphora* spikes laid in a radial arrangement, *amphora* body sherds, and tiles set in mortar (Oleson 1987: 104, fig. IV-60).

At Pompeii, Arthur undertook a systematic investigation of the pottery incorporated into the various structures of the *Insula del Menandro* (*Regio* I, *Insula* 10), identifying numerous sherds (as well as several fragments of glass and stone artifacts) embedded in walls, blockings of apertures, repairs to walls, and fixtures of various kinds constructed in mortared rubble (Arthur 1997: nos. 1, 4, 5, 10, 11, 13, 24, 30, 31, 32, 34, 35, 36, 37, 39, 44, 45, 47, 54, 55, 58, 60, 61, 62, 63, 72, 74–90, 91, 92, 93, 98, 99, 100). The various structures that included pottery spanned the entire period of the block’s structural history, from the late third/mid second century B.C. through the period between the earthquake of A.D. 62 and the eruption of A.D. 79. The several score sherds identified belonged for the most part to the classes of tablewares and *amphorae* most commonly attested at Pompeii, including Black Gloss Ware, Italian *Sigillata*, the Dressel 1 and Dressel 2–4 *amphora*, and *amphorae* of indeterminate class manufactured in the local/regional black sand fabric.

At Wadi Umm Hussein, several *amphora* spikes, presumably for the most part from examples of the Egyptian Biconical *amphora*, were wedged horizontally into a crack between slabs of granite functioning as an enclosing wall around a bread oven (Maxfield 2001: 67, 83 fig. 4.17).

9.6 / Recycling as Facing in Concrete Construction

Pottery was on rare occasions employed as a facing material in *opus caementicium*. The *Domus di Giove Fulminatore* at Ostia (*Regio* 4, *Insula* 4, doorway 3) provides a good example of this practice (Arena Taddei 1977: 30–31, XIX fig. 35; Pavolini 1983: 190). The *opus caementicium* wall at the north side of this structure is generally considered to belong to the building’s first phase, which has been assigned a date in the middle of the second century B.C. This wall is of extremely irregular construction, presenting several distinct zones consisting of horizontal strips distinguished by different forms of facing, all executed in a fairly haphazard fashion (Figure 9.1). The central zone of the wall is characterized by facing in *opus incertum*, that is, an irregular arrangement of *tufelli* (small, more or less regularly dressed



FIGURE 9.1. *Opus caementicium* wall with facing consisting in part of recycled pieces of pottery at Domus di Giove Fulminatore at Ostia. Photo: JTP.

chunks of tufo). The zones above and below this zone are faced primarily with fragments of tile and perhaps also brick. Among the facing elements in these two zones is a modest representation of pottery fragments, including, most conspicuously, several *amphora* bottoms/spikes and one *amphora* top. All of the *amphora* bottoms/spikes employed in this way are oriented with the bottom of the spike toward the interior of the wall, much as if they were *tufelli*. In several cases these are clustered in groups of ca. five to six examples, although a few bottoms/spikes also occur in isolation (Figure 9.2). The *amphora* bottoms/spikes appear to be from a Dressel 1s or perhaps Dressel 2–4s, with some in the black sand fabric characteristic of the Bay of Naples region. The one *amphora* top is certainly not from Dressel 1, and may perhaps derive from a Dressel 2–4. These observations call into question the second-century-B.C. date generally assumed for this wall, suggesting that it may have been constructed no earlier than the introduction of the



FIGURE 9.2. Detail of pottery recycled as facing in wall shown in Figure 9.1. Left: group of *amphora* bottoms/spikes. Right: *dolium* fragment. Photos: JTP.

Dressel 2–4, that is, ca. 25–15 B.C. A large fragment of a *dolium* rim was employed as facing in the upper zone (Figure 9.2). Also visible are an *amphora* handle and several *amphora* body sherds, although the poor state of preservation of the wall leaves it unclear whether these represent facing elements, filler, or elements introduced into the wall in the context of a repair. The large number of *amphora* bottoms/spikes employed as facing elements in this wall is a point of some interest. They may well represent the by-products of the reduction of a group of containers to sherds, perhaps for use as filler in the construction of the wall. This is the sole instance of the use of significant numbers of pottery fragments as facing elements in an *opus caementicium* wall that has been documented at Ostia.

9.7 / Recycling as Surfacing Material in Pavements

Pottery was occasionally employed as a surfacing material in pavements, either by simply being placed on the ground and rammed or trampled into place, or by being bonded in place by means of mortar. A good example of the first of these two applications comes from Autun [Augustodunum]. Here, excavations along the town's *cardo maximus* (main north–south thoroughfare) showed that it was bordered to its west by a footpath that, in the section unearthed, was surfaced with over 50,000 sherds (Rhodes 1989: 55). These sherds, dating for the most part to the period ca. A.D. 140–160, may have been refuse from pottery shops housed in a nearby set of stalls.

At Pompeii, the Casa dei Ceii (*Regio* 1, *Insula* 6, doorway 15) provides an example of the second of these two applications (De Vos and De Vos 1982:

98–100; Michel 1990). Here, the house's *impluvium*, probably constructed during the period ca. 150–100 B.C., was surfaced with what was, in effect, an *opus figlinum* paving (see Section 9.9) composed of *amphora* sherds set closely together on their edges (Michel 1990: 20, 66; De Vos 1991: 39) (Figure 9.3).⁷

9.8 / Recycling as Reagent/Fill in Impermeable Cement Linings and Wall/Vault Surfacing

The Romans regularly employed crushed ceramic material as a fill/reagent in cement linings and wall surfacings that were required to be water-resistant. In this case, the ceramic material should be regarded as a fill/reagent rather than simply as a fill, inasmuch as the lime in the mortar, when hydrated, reacted with the aluminosilicates present in the glassy phase of the crushed ceramic to yield a highly resistant, relatively impermeable compound (Pratt 1976: 223–4; Chiari, Santarelli and Torracca 1992: 127; Grandi Carletti 2001: 184 n. 2; Lancaster 2005: 58). This reaction was essentially the same as that obtained by the addition of *pozzolana* to lime mortar (Chiari et al. 1992: 122; Grandi Carletti 2001: 184, n. 2). The Romans do not appear to have had any standard term for cement containing a ceramic fill/reagent, and modern scholars generally refer to it by its Italian name, *cocciopesto*/*cocciopesto* [crushed sherd].⁸



FIGURE 9.3. *Impluvium* surfaced with recycled *amphora* sherds set on edge at Casa dei Ceii at Pompeii. Left: general view. Right: detail. Photos: JTP.



FIGURE 9.4. Decomposing *cocciopesto* lining in basin at Campetti site at Veii. Photo: JTP.

Cocciopesto was widely employed to make linings for basins, channels, and other fixtures intended to hold water or other liquids and for the surfacing of facilities intended to serve for the processing of various kinds of agricultural produce (Grandi Carletti 2001: 186–7; Lancaster 2005: 58) (Figure 9.4). From both archaeological and literary evidence it is clear that *cocciopesto* was also regularly used for surfacings on walls and vaults likely to be exposed to high levels of humidity, including the extrados of vaults (Lancaster 2005: 58, 211–12), the lower 3 ft of walls and false walls (Vitruvius *De architectura* 7.4.1; 7.4.3; Faventinus *De diversis fabricis architectonicae* 24; Palladius *Opus agriculturae* 1.37.7), and the vaulted ceilings in bath suites (Vitruvius *De architectura* 5.10.3; Faventinus *De diversis fabricis architectonicae* 17; Palladius *Opus agriculturae* 1.39.5). According to Giuliani, *cocciopesto* containing relatively fine-grained ceramic fill/reagent was commonly used in Roman Greece, which did not enjoy ready access to *pozzolana*, as a preparation layer for surface renderings in marble veneer (Giuliani 1992: 93).

Archaeologists and architectural historians have shown scant interest in the detailed study of the composition of *cocciopesto*, and it is not possible to specify even in general terms what proportion of the ceramic fragments employed in its production derived from pottery and what proportion from

architectural ceramics.⁹ Studies along these lines should, however, permit considerable light to be shed on this question. For example, the casual examination of a wall surfacing of *cocciopesto* apparently added as a repair in one of the entrance arches in the mid-third-century amphitheater at El Djem, in Tunisia, shows that the ceramic component consists primarily of fragments of regionally produced cookwares/utilitarian wares, including at least one fragment deriving from a Hayes 181 pan (Figure 9.5).¹⁰ There might have been some tendency to favor pottery over architectural ceramics for the production of *cocciopesto*, as it would have been substantially easier to reduce pottery to small fragments on account of its relatively thin, generally curved walls.

9.9 / Recycling as a Reagent/Fill in Cement Pavements

Crushed ceramic material was widely employed as a fill/reagent in cement pavements of various kinds.¹¹ The reaction involved was the same as that noted in the preceding section in connection with *cocciopesto*.

Vitruvius (*De architectura* 7.1.3) provides detailed information regarding the techniques employed for the construction of cement pavements.¹² He prescribes three distinct preparation layers: the *statumen* [support], a bedding of dry-laid, fist-sized stones; the *rudus* [rubble], a rammed mixture of rubble and lime nine inches thick; and the *nucleus* (core), a layer of lime and crushed ceramic material. With regard to this last he states: *Insuper ex testa nucleus inducatur mixtionem habens ad tres partes unam calcis, ne minore crassitudine pavimentum digitorum senum*. [On top (i.e., of the *rudus*) lay the *nucleus*, with a ratio of one part lime to two of ceramic fragments, in a layer not less than six inches thick.] Elsewhere (*De architectura* 7.1.5), Vitruvius describes an

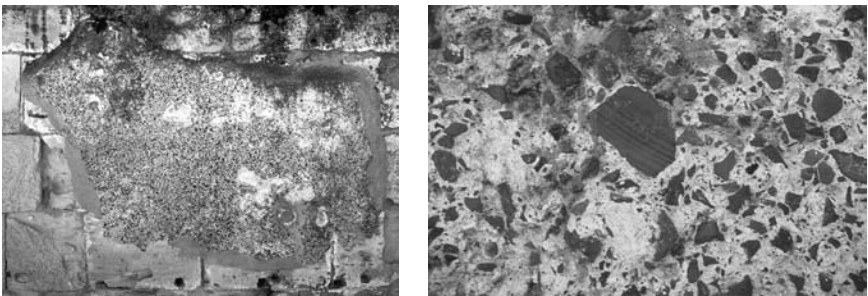


FIGURE 9.5. *Cocciopesto* wall surfacing at amphitheater at El Djem. Left: general view. Right: detail. Photos courtesy J. Ikaheimo.

alternative approach to be employed in cases where the *statumen* was to be made of planks. In this case, he specifies that the *rudus* should be a rammed mixture of two parts rubble and one part crushed ceramic fragments one foot thick, whereas the *nucleus* should be made according to the recipe given for this layer in standard pavements.

The addition of crushed ceramic material to the *nucleus* and, in some cases, the *rudus* presumably yielded a pavement that was more resistant and impermeable to moisture than would be the case with a fill consisting of stone. The top of the *nucleus* might be leveled and smoothed to serve as the pavement's treading surface. In some instances, before the *nucleus* had set, chips of stone, *tesserae* (small cubes of stone or other material), or sherds were pressed into its surface at intervals, either irregularly or in some regular pattern.¹³ Alternatively, the *nucleus* might be covered with a surfacing layer of some kind to enhance its resistance to wear and/or for decorative purposes. The more common varieties of surfacing included reddish plaster, *opus figlinum*, consisting of small terracotta bricks in any of several shapes; mosaic, also known as *opus tessellatum* and/or *opus vermiculatum*, consisting of *tesserae* of stone, glass, and/or terracotta, often arranged to create either a black and white or a polychrome design; and *opus sectile*, consisting of small slabs of marble and other varieties of stone cut to varying shapes and pieced together to form a polychrome design.

There has been little research directed at the characterization of the specific composition of the preparation layers for concrete pavements of the sort described, and it is thus unclear to what extent actual practice corresponded with the alternative schemes described by Vitruvius. As was the case with *cocciopesto*, it not known what portion of the crushed ceramic material employed would have derived from pottery and what portion from architectural ceramics. Worth noting, however, is the fact that Pliny (*Naturalis historia* 35.46.165) comments on the practice of adding crushed ceramic material to pavements in the context of an extended discussion of pottery, perhaps justifying the inference that pottery was regularly employed for this purpose.¹⁴

According to Dunbabin, Roman mosaics generally display a *rudus* and *nucleus* more or less along the lines described by Vitruvius, though with considerable variation in their thickness, the ingredients, and the proportions in which these are represented (Dunbabin 1999: 281–2). Fiori and collaborators have described two mosaic pavements from the Province of

Ravenna, one from San Severo, the other from Classe, both presumably of Roman date (Fiori, Donati, Mambelli, and Racagni 1988). In both instances there were two distinct preparation layers beneath the layer of *tesserae* (Fiori et al. 1988: 68–9). The first of these was a basal layer ca. 13–15 cm thick consisting of ceramic fragments in a lime mortar. In one case these fragments measured up to ca. 3 cm, whereas in the other they measured up to ca. 4 cm. On top of this was an intermediate layer consisting of ceramic fragments measuring up to ca. 1.5–2.0 cm in a lime mortar. Although most of the fragments appeared to be derived from architectural ceramics, some had a flat or curved shape suggesting that they were crushed pottery (Fiori et al. 1988: 72). At the Villa Settefinestre, near Cosa, mosaic and *opus sectile* pavements of the first construction phase had three to four preparation layers, the first two of which consisted of a layer up to 20 cm thick composed of a mixture of lime, sand, and ceramic fragments and a layer of lime mixed with what is termed *polvere di cocciopesto* [*cocciopesto* dust] (Carandini 1985a: 74–5). Mosaic and *opus sectile* pavements of the second construction phase, on the other hand, had four preparation layers, the first three of which consisted of a layer 9–12 cm thick composed of lime, sand, a small amount of what is termed *cocciopesto*, and various other materials, including fragments of wall plaster and sherds; a layer 3–5 cm thick composed of lime, sand, and what is termed coarse *cocciopesto*; and a layer 1–2 cm thick composed of lime, a small amount of sand, and what is termed fine *cocciopesto* (Carandini 1985a: 75). In this case, the term *cocciopesto* is presumably being employed to refer to ground or crushed ceramic material. *Opus spicatum* pavements at the villa, on the other hand, were laid atop a preparation layer consisting of lime mixed with fragments of what is termed *laterizi* up to 2 mm in size (Carandini 1985a: 75). In this instance, the term *laterizi* is presumably being employed to refer to ground ceramic material.

It is possible to develop rough estimates for the quantity of ceramic material employed as fill/reagent in the construction of pavements of this kind on the basis of the prescriptions provided by Vitruvius. If the *nucleus* layer was, on average, 6 in. or ca. 15 cm thick, and consisted of one-third ceramic fragments by volume, then each square meter of pavement would have required ca. 0.05 m³ of ceramic fragments. This figure can perhaps be rendered somewhat more meaningful by conversion to a weight figure. The standard plastic storage crates employed for the Palatine East excavations measure 52 × 33.5 × 11.5 cm, for an interior volume of ca. 0.02 m³. A series of trials carried out

with material from the Palatine East showed that one crate of sherds weighed between ca. 10.5 and 11 kg, as a function of the type of pottery and the size of the sherds, with smaller sherds closer to the size range of the ceramic fragments employed in cement pavements yielding figures near the high end of the range. Using this figure, one can calculate that 1 m³ of ceramic fragments would weigh ca. 500 to 550 kg, and 0.05 m³ of ceramic fragments, the amount required for the nucleus layer for one square meter of paving, in the neighborhood of 25 to 30 kg. The latter two figures are the equivalent of roughly two and one-half complete mid-sized Tunisian *amphorae* (Freed 1995: 189), or perhaps as many as three of these containers, if one deducts the weight of their spikes and handles, which, as noted above, could not have been readily reduced to small fragments.

One may go on to consider how much of this material might have been required to fabricate the pavements in an average Roman town. De Vos, in her survey of pavements at Pompeii, identified four major types: *battuti* (pavements with a *nucleus* containing a fill or fill/reagent component consisting of crushed material) of three distinct varieties as determined by the type of fill or fill/reagent that they contained (i.e., fragments of limestone, lava, or ceramic), mosaics, ceramic tile pavements, and pebble pavements, producing a map that shows the distribution of these over the whole of the excavated portion of the site (De Vos 1981: 179). She estimated that of the ca. 30,000 square meters of built-up area in an unspecified set of *insulae* in *Regio* I, ca. 2.5% was covered with mosaic pavements, whereas another ca. 7% was covered with *battuti* (De Vos 1981: 180, 1991: 37–8). Of the latter, a significant portion would have consisted of *battuti* containing either limestone or lava fragments, which presumably would not have involved preparation layers containing significant amounts of ceramic fragments as fill. An impressionistic evaluation of De Vos' distribution map suggests that the area covered by pavements of these two kinds amounts to ca. one-third to one-half of the total surface area covered by *battuti*. One can thus estimate that something on the order of 5 to 7.5% of the built-up area in this *regio*, or ca. 1,500 to 2,250 square meters, was covered with pavements that included a *nucleus* made with fill/reagent consisting of ceramic fragments. Employing the figures developed above, one can calculate that the construction of this amount of pavement would have required in the neighborhood of 37,500 to 67,500 kg of ceramic fragments. Although these figures are the product of a series of assumptions and estimates, and thus represent only a

very approximate set of values, they nevertheless serve to suggest the general order of magnitude of the amount of ceramic material that would have been employed for the production of pavements in a town like Pompeii. Ostia and Rome, which from the middle of the first century to the middle of the third century made far more extensive use of cement pavement and contained a higher proportion of buildings with cement pavements on two or more stories, would have employed significantly larger amounts of ceramic material per hectare of built-up area.

9.10 / *Recycling as a Reagent/Fill in Mortar*

The Romans sometimes employed pulverized ceramic material as a reagent/fill in mortar (*materia*, *maltha*).¹⁵ Vitruvius (*De architectura* 2.5.1), when discussing the mixing of mortar, recognizes three distinct kinds of sand that can be employed as a filler: *harena fossica* [pit sand], *harena fluviatica* [river sand], and *harena marina* [sea sand]. In the case of the first of these three varieties, he specifies a mixture of three parts sand to one part lime, whereas for the other two he recommends two parts of sand to one part lime, adding: *Etiam in fluviatica aut marina si qui testam tunsam et succretam ex tertia parte adiecerit, efficiet materiae temperaturam ad usum meliorem*. [Also, in the case of river or sea sand, if one adds crushed and sieved ceramic in an amount equal to one-third, he will obtain a mixing of material that is more satisfactory for use.]¹⁶ Palladius (*Opus agriculturae* 1.40), in providing the recipe for the mortar that should be employed to seal cracks in the basin in the *calidarium* [hot room] of a bath suite, indicates that this should include *testa minuta* [tiny fragments of ceramic]. In this case, it is clear that the ceramic material was added as a reagent with a view to enhancing the mortar's resistance to the humidity to which it would have been exposed.

As was the case with *cocciopesto* and cement pavements, archaeologists and architectural historians have shown little interest in the detailed description of Roman mortar, and it is unclear whether pulverized ceramic material was added to it on a regular basis, and when this was the case, whether this material consisted of pulverized pottery or pulverized architectural ceramic.¹⁷ Viaene and colleagues have undertaken a petrographic analysis of the mortars employed in Roman-period structures at Sagalassos, in southwestern Turkey, finding that these regularly contain pulverized ceramic material (Viaene, Waelkens, and Ottenburgs 1997: 412–17). Poblome has suggested that this material was obtained by grinding the waster pottery generated by

the several pottery workshops that were active in the town (Poblome 1998). Elsewhere, Chiari and collaborators have published a photomicrograph of a thin section of mortar employed in a repair at Trajan's Markets, in Rome, that contains fine-grained ceramic inclusions (Chiari et al. 1992: 130 fig. 14). According to these scholars, the aplastic materials in these inclusions display a preferred orientation, indicating that they are fragments of wheel-thrown pottery rather than bits of architectural ceramic (Chiari et al. 1992: 129).

9.11 / *Recycling as Reagent/Fill in Wall Plaster and Plaster Architectural Elements*

Ceramic material was also sometimes employed as a fill/reagent in wall plaster and in architectural elements rendered in plaster.¹⁸ The most detailed evidence for this practice comes from the Villa Settefinestre. Here, painted plaster wall surfacings of the first construction phase consisted of two layers, a preparation layer 3–7 cm thick composed of lime, sand, and a small amount of what is termed *cocciopesto*, and a surface layer 0.02–1.2 cm thick consisting of lime and calcite, with an additional layer 0.02 cm thick composed of lime, calcite, and what is termed *cocciopesto* added in the socle zone (Carandini 1985a: 76–7). Painted plaster wall surfacings of the second construction phase consisted of three layers, a preparation layer 0.8–3 cm thick consisting of lime, sand, and straw, an intermediate layer 0.5–2.5 cm thick consisting of lime and calcite, and a surface layer 0.05–0.9 cm thick consisting of lime and what is termed finely ground *cocciopesto* (Carandini 1985a: 77). Painted ceiling plaster from the villa also in many cases had a surface layer that contained what is termed *polvere di cocciopesto* (Carandini 1985a: 78–9). Unpainted plaster wall surfacings in rooms subject to high levels of humidity consisted of a mixture of lime, sand, and what is termed *cocciopesto* (Carandini 1985a: 77–8). In all of these cases, the term *cocciopesto* is presumably being used to refer to ground ceramic material.

The excavation of the Villa Settefinestre also yielded several fragments of a molded stucco cornice that had a preparation layer that included filler consisting of sherds (Carandini 1985a: 78 fig. 91). These ranged up to ca. 5 cm in size in the part of the layer that would have been adjacent to the wall, and up to ca. 1 cm in size in the outer portion of the layer. This cornice apparently belonged to a loggia constructed during the middle years of the first century B.C. The inclusion of sherds in the preparation layer probably reflected the fact that the cornice was meant to be exposed to the elements.

Elsewhere, Arthur, in his study of the pottery incorporated in the structures of the *Insula del Menandro* at Pompeii, identified several locations where wall plaster contained very small bits of pottery, apparently added as a filler (Arthur 1997: nos. 18, 40–42, 43, 48, 49, 56). Pratt states that wall plaster from Roman-period structures in Britain frequently contains powdered ceramic material, noting that this would have made such coatings more resistant to damp (Pratt 1976: 224). The analysis of a mortar specimen from a structure dated to the period A.D. 220–400 at Stonea revealed the presence of fragments of crushed ceramic ranging up to ca. 1 cm across (Middleton 1996).

9.12 / *Recycling as Temper for Ceramics*

Pulverized ceramic material was on occasion utilized as temper in pottery and architectural ceramics. Material of this kind, generally termed grog (or, less often, *chamotte*), has been employed by potters in many different cultures (Rye 1981: 33; Rice 1987: 229, 304, 407, 411–12). Its use is considered advantageous by potters due to the fact that it is often readily available at no cost and can be crushed into granule- and sand-sized particles with relatively little effort (compared, for example, with uncalcinated shell and many kinds of rocks and minerals). Further, as an inclusion in a fired ceramic body, pulverized ceramic material offers a coefficient of thermal expansion similar or identical to that of the surrounding glassy phase, meaning that, when employed as a tempering agent in cookwares, it produces only a very modest amount of thermal fatigue. On the negative side is the fact that in many areas it is possible to obtain material suitable for use as temper that requires virtually no preparation (e.g., quartz sand). Further, it is difficult to reduce high-fired ceramic material to a grain size below the coarse to very coarse sand size range (ca. 0.05–0.2 cm) without the expenditure of considerable effort, meaning that grog is not well suited for the manufacture of thin-walled pottery and wheel-thrown pottery in general.

Grog-tempered pottery is fairly uncommon in the Roman world, presumably due in substantial measure to the negative factors indicated above. Grog-tempered wares are attested in modest amounts in some areas within the western provinces of the empire, presumably due to the persistence of elements of a ceramic technological tradition that extended back to the pre-Roman period, including not just the use of grog temper, but also the practice of hand forming. Some idea of the rarity of grog-tempered wares can be obtained from the handbook of pottery fabrics for Roman Britain

compiled by Tomber and Dore (Tomber and Dore 1998). Of the 193 distinct fabrics included in this work, just 5 include grog temper as a regular component. These are associated with five relatively minor wares manufactured in Britain, three of which were formed exclusively by hand (Tomber and Dore 1998: 139 Hampshire Grog-Tempered ware, 167 Patchgrove Grog-Tempered ware, 214 Southern “British” [“Belgic”] Grog-Tempered ware), one both by hand and by throwing on the wheel (Tomber and Dore 1998: 210 Pink Grog-Tempered ware), and only one exclusively by throwing on the wheel (Tomber and Dore 1998: 191 Savernake Grog-Tempered ware). In each of these wares the grog temper ranged up to at least 1 mm in size, with two wares containing particles measuring as large as 0.4–0.45 cm. It seems likely that the bulk of the ceramic material recycled as grog temper was drawn from the considerable amount of waster pottery that was available at virtually all pottery production workshops or, in the case of casual production among part-time potters, the domestic refuse on hand in and around residences.

Turning to the eastern provinces, the petrographic analysis of ceramic materials from Sagalassos has revealed the presence of argillaceous inclusions perhaps to be identified as grog temper in *dolia*, utilitarian wares, and architectural ceramics, all apparently of local manufacture (Degeest 2000: 78–91, Fabric 2, 3, 5). Although most of these items were formed by hand, some were thrown on the wheel wholly or in part. Poblome has argued that the absence of pottery overfired to the point of vitrification, bloating, or slumping among the several waster dumps that have been excavated in the potters’ quarter at Sagalassos suggests that the potters working there carefully sorted the waster pottery that accumulated during the various phases of the manufacturing process, setting aside the materials that were fired, but not highly overfired, for recycling as grog temper (Poblome 1998).

In general, grog temper seems better suited for the manufacture of architectural ceramics than for the manufacture of pottery, and it seems likely that the mineralogical analysis of brick, tile, and other architectural items will reveal that it was employed on a regular basis for the manufacture of these at several locales around the Roman world.

9.13 / *Recycling as a Salve, Flavoring Agent, etc.*

It seems likely that the Romans employed granulated ceramic, including pottery, in smaller or larger amounts as a flavoring agent, a salve, and a coloring agent, and for a wide range of applications of this kind. The passage in

the *Geoponica* (7.24) discussed in Section 9.1, for example, advises mixing material obtained by crushing the body of a used wine *amphorae* into new wine in order to impart the flavor of aged wine. Columella (*De re rustica* 6.14–17), in discussing how to prevent chafing on the neck of oxen, states: *pulveri lateritio trito priusquam disiungantur, colla conspergi oportet* [before they are unyoked their necks ought to be sprinkled with dust made by grinding brick].

10

Discard and Reclamation



This chapter considers the behavioral practices of discard and reclamation. Because discard and reclamation played a crucial role in the formation of the Roman pottery record, they are here subject to comprehensive and detailed treatment. As defined in Chapter 1, discard entails the deliberate and voluntary abandonment of a vessel or a vessel part by those using it with the intent of no longer using it, whereas reclamation entails the acquisition of a vessel or a vessel part after its discard. Roman pottery could have been subject to discard at the termination of its manufacture, distribution, prime use, or reuse. Vessels and vessel parts that had been discarded could have been reclaimed from abandonment deposition for some reuse or recycling application, or allowed to remain in abandonment deposition, eventually being incorporated into an archaeological deposit, and thereby exiting the systemic context. Discarded vessels and vessel parts that came to be incorporated into an archaeological deposit could have been reclaimed either for some reuse application, thereby reentering the systemic context, or for some recycling application, in which case they lost their identity as discrete artifacts and, in this sense, did not reenter the systemic context.

Four general types of behavioral loci in the Roman world generated significant amounts of pottery that was disposed of by discard:

1. Pottery workshops.
2. Wholesale/storage and retail facilities for pottery.
3. Wholesale/storage and bulk retail facilities for wine, oil, and/or fish products.
4. Residences and other loci where food was regularly stored in small or moderate quantities, prepared, and consumed (e.g., bars and restaurants, workshops and other work sites, sanctuaries, meeting facilities for *corpora* and *collegia*, *necropoleis*, ships and boats).

This chapter considers the evidence for pottery discard in each of these four types of behavioral loci. Before doing so, it discusses two topics that

represent essential background information for a consideration of pottery discard in the Roman world – ethnoarchaeological research concerned with refuse discard practices in complex societies analogous to the Roman case, and the evidence for general practices of refuse discard in the Roman world. It then concludes with a brief consideration of the very limited amount of evidence available pertaining to the reclamation of pottery in the Roman world.

10.1 / *Ethnoarchaeological Research Concerning Refuse Disposal*

Ethnoarchaeological studies focusing on refuse discard practices among contemporary groups may provide insights that elucidate practices of pottery discard and discard practices more generally in the Roman world. To date, there has been only a modest amount of ethnoarchaeological research carried out with the goal of documenting practices of refuse discard within complex societies analogous to the Roman case, with most of the work that has been undertaken concerned with communities of village agriculturalists rather than with urban groups (David and Kramer 2001: 91–115). This section describes the results of two of the most informative studies of this kind, drawing on this information to formulate a set of general observations regarding refuse discard practices among village agriculturalists that provides a framework for evaluating the evidence for pottery discard in the Roman world.

The ethnoarchaeological research project that has produced the most detailed information regarding refuse discard practices among village agriculturalists was undertaken under the direction of Hayden and Cannon in the highlands of southern Mexico and northwest Guatemala during the period 1977 to 1979 (Hayden and Cannon 1983). This involved the documentation of practices for the discard of domestic refuse in two Tzeltal Maya villages, Chanal and Aguacatenango, located in Chiapas, Mexico, and one Chuj Maya village, San Mateo Ixtatan, located in northwest Guatemala. As part of this work, which was carried out using a combination of observation and informant interview, Deal undertook a study concerned specifically with practices of and patterns in the discard of domestic pottery refuse in the two Tzeltal settlements (Deal 1985). In each village data were collected for ca. fifty households. The locus of residence for these households consisted of a compound measuring ca. 1,000 to 3,000 square meters in area enclosed by a high wooden fence or hedge that contained several separate one-room structures arranged around a patio. The remainder of the compound was given over to agriculture, either as a corn (maize) field or as a garden. The

structures in these compounds were built using a variety of materials and techniques, including wattle and daub, mud brick, and wood; they generally consisted of a house, a kitchen, a storage shed, and a sweat bath. These structures were subject to periodic renovation, during the course of which they might be converted from one function to a different one. A structure was usually abandoned after a period of ca. 20 years, with a new structure built elsewhere in the compound to fulfill the same function. Abandoned structures were eventually dismantled so that their materials could be reused or recycled, and the land on which they stood was returned to agricultural use.

The researchers collected information regarding the discard of various categories of refuse, including bone, ashes from cooking fires, house sweepings, pottery, stone, grindstones, glass, and various other kinds of inorganic material. Ashes and house sweepings were often disposed of inside the compound, either by being dumped in an out-of-the-way location or by being scattered over the surface of the garden plots as fertilizer. Several different kinds of material, including pottery, were subject to provisional discard, either in various out-of-the-way locations inside residential structures, or in concentrated deposits stretching along the exterior walls of structures, along the edge of the patio, inside storage structures, inside abandoned structures, and along the compound's enclosure wall. Materials placed in provisional discard were eventually subject to definitive discard, either in some out-of-the-way place within the compound – sometimes an open pit that had been dug for some other purpose – or, more commonly, somewhere outside the compound. The locales employed for refuse disposal outside compounds included village streets, communal refuse middens located either inside or at the edge of the settlement, and a stream or ravine that demarcated the edge of the village. The locus of definitive discard rarely lay more than a two-minute walk from the compound where the refuse originated. Ashes and house sweepings, however, were sometimes carried to more distant agricultural plots and spread over their surfaces as fertilizer.

There were pronounced differences in discard practices between the three villages. For example, definitive discard outside the compound was considerably more common at Chanal than at the other two villages, despite the existence there of municipal regulations that forbade the dumping of refuse in public thoroughfares. Also interesting was the fact that the tendency to dispose of refuse in a public thoroughfare was inversely related to the

density of household compounds. In general, the factors that determined where refuse was disposed of and when this was done included its potential reuse/recycling value, the hindrance that it would have represented to day-to-day activities were it not subject to discard outside the compound, and the amount of effort required to effect its discard outside the compound.

The second ethnoarchaeological study to be considered is that carried out in 1980 by Kamp at Darnaj, a Bu Hasan Arab village located on the bank of the Euphrates River, in eastern Syria (Kamp 1991). This settlement, which contained ca. 1,500 residents, consisted of ca. 200 household compounds interspersed with open fields and irrigation canals. The study involved the evaluation of thirty of these compounds by means of observation and informant interview, with information collected regarding a wide array of topics, including practices of refuse discard.

The household compounds at Darnaj consisted of several rooms constructed of mud brick arranged around an enclosed courtyard. These included a sitting room, a kitchen, rooms for the storage of foodstuffs, and rooms for the storage of goods. The inhabitants of the village practiced extensive reuse and recycling of material goods, particularly items not produced locally, with the result that households generated only a very modest amount of refuse. Most food waste was fed to chickens, sheep, goats, and/or dogs kept inside the compound. Other combustible refuse, such as paper, was burned in the compound's cooking hearth or bread oven. Worn out or broken items, including broken water jars, were subject to provisional discard, often being cached either in one of the storerooms or in the corner of the courtyard. Small amounts of ash and house sweepings were often disposed of by being tossed over the compound's enclosure wall. Most households, however, made regular use of a refuse midden located a short distance from the compound, where various kinds of undesirable waste were dumped, including human excrement, glass fragments, large metal objects, and refuse generated in large quantities, such as the ash collected in the course of cleaning out the household's oven. Although Kamp does not indicate where pottery was disposed of, it seems likely that a substantial amount ultimately found its way to these middens. These features ranged in size from small surface scatters to mounds of substantial dimensions, and were sometimes located inside abandoned, unroofed rooms. Some households, especially those located near the Euphrates, disposed of their refuse by dumping it into the river.

Although the two studies just described represent an extremely narrow evidentiary base and leave unanswered many questions regarding practices of refuse discard in the communities where they were undertaken, the fact that they document broadly similar sets of behaviors suggests that they can be employed to formulate a list of what may be regarded as common refuse discard practices among communities of village agriculturalists. These can be stated as follows:

1. Pottery disposed of by discard is generally disposed of along with other domestic refuse, including both organic and inorganic materials.
2. Some pots, especially large storage jars and similar vessels, are frequently cached in provisional discard in some out-of-the-way place within the residential compound.
3. Some domestic refuse is disposed of in out-of-the-way places around the residential compound, with features that constitute an enclosed depositional basin, such as abandoned rooms, outbuildings, fixtures, and pits, particularly favored for this purpose.
4. A substantial portion of domestic refuse is disposed of outside of but within a short distance of the residential compound.
5. Domestic refuse discarded outside of the residential compound may be disposed of by being dumped into a public thoroughfare, in some out-of-the-way public or privately owned space within the settlement, such as an abandoned structure, with features that represent an enclosed depositional basin favored, or into a declivity or watercourse that demarcates the edge of the settlement.
6. Domestic refuse is sometimes disposed of in locations outside the residential compound, in contravention of legal provisions.
7. A single residential unit or multiple residential units may dispose of domestic refuse by dumping it in a specific public or privately owned space within a settlement or into a declivity or watercourse that demarcated its edge in an ongoing fashion, leading to the formation of a sizable refuse midden.
8. Some inorganic domestic refuse, perhaps including pottery, is mixed in with cooking ash, which may be disposed of by being spread over the surface of either a garden plot within the residential compound or an agricultural field outside the residential compound as fertilizer, or by being dumped on a refuse midden.

This inferred set of what are assumed to be common refuse discard practices can be employed to help identify, organize, and interpret the evidence for pottery discard in the Roman case.

10.2 / *General Aspects of Refuse Discard in the Roman World*

To the author's knowledge, there has been no effort to undertake a comprehensive study of refuse discard in the Roman world, and many aspects of this important topic remain poorly understood.¹ For purposes of discussion it is useful to recognize a distinction between refuse discard in cities and towns (henceforth referred to as towns) and refuse discard in rural areas in the Roman world. Turning first to towns, their high population densities, elevated standard of living, and socioeconomic complexity meant that they probably tended to generate relatively large volumes of refuse representing a wide variety of different materials. At the same time, the high ratio of developed space to undeveloped space in towns, combined with the existence of legal regulations restricting where it was permitted to discard refuse, constrained the ways in which the inhabitants of towns could dispose of this material. The ethnoarchaeological evidence discussed in the preceding section suggests that each of the several industrial/commercial establishments, residential groups, etc. that generated refuse in a Roman town may have disposed of this material in several different locations, abandoning a portion on the premises where it was generated, a portion in various locations situated elsewhere inside the built-up area of the town, and a portion beyond the edge of the built-up area.

Romans probably employed a variety of different means for transferring solid refuse from the point where it was generated to some other location for discard. Passages in the literary sources refer to the use of hard baskets of different sizes and shapes for the transport of manure (Columella *De re rustica* 10.81–3 [*qualus*]; Isidorus *Origines* 20.9.9 [*cophinus*]; Cato *De agri cultura* 10.3, 11.4 [*sirpea*]),² and it seems possible that containers of this kind were regularly employed for the transport of other kinds of refuse. Refuse also might have been placed inside an *amphora*, an *amphora* with its top removed, an *amphora* bottom, a wooden bucket, a cask, or a cloth sack, or wrapped in a mat, blanket, or piece of cloth and carried to the disposal site. Alternatively, a large sherd, a fragment of basketry or matting, or a rag that was itself marked for discard might have been utilized for this purpose. Literary sources indicate that in some cases the transfer of large amounts of refuse and/or its movement over longer distances was accomplished by

means of a hurdle (Cato *De agri cultura* 10.3, 11.4 [*crates stercoraria*]), a mule (Libanius *Orationes* 50), or a wagon (*Lex tabulae Heracleensis* 66–7; Valerius Maximus *Facta et dicta memorabilia* 1.7 ext. 10; *Digesta* 33.7.12.10 [Ulpianus]; Tacitus *Annales ab excessu divi Augusti* 11.32.3).

One of the most important questions concerning practices of refuse disposal in Roman towns concerns the extent to which municipal administrations provided for the regular collection and removal of refuse. The textual evidence on this point is slight and indeterminate, whereas the archaeological evidence is ambiguous, leaving the question largely unresolved (Liebeschuetz 2000; Jansen 2000). Panciera has reviewed the textual evidence concerning the city of Rome, arguing that the existence of a refuse collection service of some sort can be inferred from the late-republican *Lex tabulae Heracleensis*, which specifies that the maintenance and cleaning of the city's roads should continue with the same arrangements as had previously been in force, mentioning wagons that served to cart *stercus* [refuse] out of the city (Panciera 2000: 102).³ He suggests that in imperial times the supervision of this service would have fallen to the officials known as the *quattuorviri viarum curandarum* (Panciera 2000: 103), conjecturing that they arranged for the letting out of contracts to private individuals (perhaps the men known as *stercorarii*) who collected refuse from designated dumping points and carted it to dumping grounds located outside the city for disposal (Panciera 2000: 105). Indeed, one should probably attribute the fairly sharp distinction between the archaeological record of Rome during the early and middle empire and that of the late empire, when large areas of the city came to be buried under massive deposits of domestic and construction refuse, to the discontinuation of this service at some point during the second half of the third century.⁴ The retention of the provisions regarding refuse collection at Rome in the *Lex tabulae Heracleensis* suggests that the municipal administrations of at least some other towns provided for the regular collection of refuse.⁵ The individuals known as *stercorarii* may also have undertaken work of this kind on their own initiative, carting away the fill from cesspits and perhaps other kinds of refuse for payment (Panciera 2000: 100).

In cases where the inhabitants of a Roman town did enjoy access to a regular refuse collection service of some kind, one would expect that this resulted in the generation of one or more large refuse middens somewhere outside the settlement, often only a very short distance beyond its built-up area. The ethnoarchaeological evidence discussed in the preceding section,

however, suggests that the inhabitants of Roman towns often may have disposed of refuse by carrying it to the edge of the settlement and either dumping it into a watercourse or declivity that marked its boundary, or, in the case of fortified settlements, dumping it from the top of the wall. That this was, in fact, a common practice at Rome, for example, is indicated by an inscription from the area of the Esquiline Hill outside the Servian Walls listing the rules that governed the location of burials, to which was added the admonition *stercus longe aufer, ne malum habeas* [carry your refuse to a considerable distance, lest some evil befall you] (*ILLRP* 485).⁶ Large refuse middens immediately outside the built-up area of towns thus may have been produced by industrial/commercial establishments, residential groups, construction crews, etc. disposing of the refuse that they generated on their own initiative. The presence of features of this kind should not therefore be taken as proof of the existence of a regular refuse collection service at the settlements at which they occur.

The best evidence for refuse middens of this kind comes from Pompeii. According to Maiuri, excavations undertaken in 1933 outside the north wall of the town revealed a refuse deposit that extended the entire way from the Porta Ercolono to the Porta Vesuvio, a distance of roughly 250 m (Maiuri 2002: 174–5). This deposit, which measured 1.4–1.5 m thick and covered the extramural road as well as several tombs, appears to have been composed of a mix of construction and domestic refuse, including roof tile, fragments of pavement, pieces of wall plaster, and what Maiuri termed “*vasellame rustico*” [coarse/utilitarian pottery?] in a limey matrix. As the painted wall plaster consisted primarily of pieces in the first, second, and third Pompeian styles, Maiuri inferred that the deposit represented debris that had been collected in the course of cleanup operations following the earthquake of A.D. 62. It may thus represent the result of a single initiative or a limited number of initiatives carried out in the context of extraordinary circumstances rather than the ongoing operation of a municipally organized system for the regular collection and disposal of refuse or the ongoing discard of refuse by those who created it.

A program of excavation along the outer face of the fortification wall from the Porta di Nola westward as far as Tower 8, a distance of ca. 175 m, carried out in 1976 under the direction of Chiaramonte Treré produced evidence for the much more intermittent discard of refuse in this area (Chiaramonte Treré 1986: 21–54). In this instance, two middens, termed *Cumulo* 1 and *Cumulo* 2, were found against the exterior face of the wall immediately to

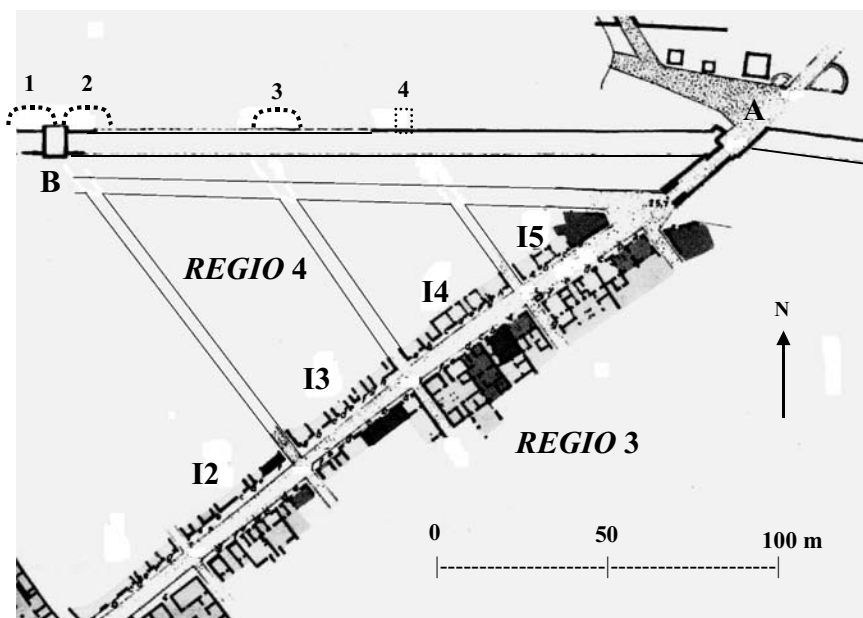


FIGURE 10.1. Plan of Porta di Nola/Tower 8 area of Pompeii. After Eschbach 1970. A: Porta di Nola. B: Tower 8. 1: *Cumulo* 1. 2: *Cumulo* 2. 3: *Cumulo* 3. 4: Test Trench midden. Wall circuit road and NW-SE streets in *Regio* 4 conjectural, produced by extending extant lines at eastern/southeastern end of thoroughfare. Inner and outer faces of fortification wall regularized. Outlines of *Cumuli* 1-3 and test trench approximate and not to scale.

the west and east of Tower 8, respectively, whereas a third midden, termed *Cumulo* 3, was found against the exterior face of the wall ca. 55 m to the east of the tower (Chiaramonte Treré 1986: tav. VIII; Romanazzi and Volonté 1986: 55) (Figure 10.1). All three of these features, which consisted of a mass of earth containing fragments of roof tile, plaster, and pottery, as well as artifacts in bronze, glass, bone, and shell, were excavated down to the ground surface on which they had been deposited. *Cumulo* 1 measured 6 m long (i.e., along the face of the wall/tower), 3 m wide, and 0.85 m thick, for a volume of ca. 15.3 m³, *Cumulo* 2 measured 4.8 m long, 3 m wide, and 0.58 m thick, for a volume of ca. 8.4 m³; and *Cumulo* 3 measured 13 m long; 3 m wide, and 0.85 m thick, for a volume of ca. 33.2 m³. A test trench along the exterior face of the wall further to the east of *Cumulo* 3 measuring 2.3 × 1.8 m uncovered a portion of a fourth such midden (Figure 10.2). In this instance the deposit was relatively shallow, only ca. 15 cm thick, due apparently to the removal of its upper portion in the course of an

earlier excavation carried out in this area. Romanazzi and Volonté carried out a detailed typological study of the materials recovered in these features that they were able to classify, including *Bucchero*, Campanian Red-Figure Ware, Black Gloss Ware, Internal Red-Slip Cookware, various tablewares and cookwares of probable local origin, *unguentaria*, thin-walled wares, Italian *Sigillata*, lamps, and glass vessels (Romanazzi and Volonté 1986). Unfortunately, nothing is known about the other classes of pottery (e.g., *amphorae*) and other items (e.g., animal bone) contained in these deposits, nor is any quantitative evidence available, save for the number of lamp fragments recovered in each of the middens.

Romanazzi and Volonté noted that ca. 90% of the datable materials recovered in these features belonged either to the Julio-Claudian or to the early Flavian period, and, perhaps influenced by Maiuri's interpretation of the massive midden found outside the wall between the Porta Ercolano and Porta Vesuvio, expressed the view that these features were the result of cleanup operations carried out in the aftermath of the earthquake of



FIGURE 10.2. Pompeii: Test trench against outer face of fortification wall to west of Porta di Nola. Chiamonte Treré 1986: tav. XV.3. Lower, slightly projecting stratigraphic unit visible in baulk is lower portion of refuse midden left by Maiuri excavations.

A.D. 62 (Romanazzi and Volonté 1986: 55). Given the modest size and discontinuous nature of these features, however, it is not clear why they cannot just as easily be interpreted as the product of the ongoing, routine disposal of small amounts of normal domestic and construction refuse by those who generated it. Regardless of the correct interpretation, it is worth noting that *Cumulo* 1 and *Cumulo* 2 appear to have been created by the dumping of refuse directly from Tower 8, which is situated at the point where the street separating *Regio* 4, *Insulae* 2 and 3 would have reached the circuit road running along the inner face of the wall, whereas *Cumulo* 3 and the midden partially exposed in the test trench farther to the east of it lie roughly opposite the points where the next two streets to the east, that is, those separating *Regio* 4, *Insulae* 3 and 4 and *Regio* 4, *Insulae* 4 and 5, respectively, would have reached the circuit road. This pattern suggests that the persons who discarded the refuse that wound up in these deposits, presumably living and/or working in *Regiones* 3 and 4, transferred their load to the end of one of these three streets, mounted the battlements with this material in tow (perhaps employing access routes created for precisely this purpose), and dumped it over the parapet.

Not surprisingly, deposits of this kind are known from other towns in the Roman world. At Rimini [Ariminium], on the central Adriatic coast of Italy, excavation has uncovered sizable deposits of refuse dating to the late imperial period along the outer face of the town's fortification wall (Gelichi, 2000: 17). At Tarragona, in Spain, Tarrats describes a refuse deposit recovered inside a disused clay extraction pit immediately outside the walls that appears to have accumulated over the course of the period ca. A.D. 15/20–55/60 (Tarrats 2000: 133). This consisted of mixed domestic and industrial refuse, including pottery belonging to a variety of functional groups and classes and sherds of waster pottery that presumably originated at a workshop located somewhere in the immediate vicinity. As discussed below, two large refuse middens have been documented immediately outside the late-first- to mid-third-century quarry settlement at Wadi Umm Hussein, in the Eastern Desert of Egypt. Finally, Carver, without providing detailed information, states that the disposal of refuse immediately outside the settled area of towns was a common practice in Britain during the Roman period (Carver 1987: 34).

Both literary sources and archaeological evidence confirm the assumption that substantial amounts of refuse were discarded within the built-up areas of

Roman towns. A significant portion of this material was likely disposed of by the simple expedient of throwing it from a doorway or a window or over an enclosure wall into an adjacent public thoroughfare. That this was a common practice is indicated by the fact that an entire title of the *Digesta*, 9.3 *De his, qui effuderint vel deiecerint* [Concerning Those Who Pour Out or Throw Out], was dedicated to legal questions arising from it (Liebeschuetz 2000: 59).⁷ That broken pottery was sometimes disposed of by being thrown from buildings is indicated in a passage by Juvenal (*Satura* 3: 269–77), in which he recounts the dangers of walking the streets of Rome after dark: *Respice nunc alia ac diversa pericula noctis: quod spatium tectis sublimibus unde cerebrum testa ferit, quotiens rimosa et curta fenestris vasa cadunt, quanto precussam pondere signent et laedant silicem*. [Consider now the various and sundry dangers of the night: how far up it is to the towering roofs, whence a sherd bashes me on the head each time that cracked or broken pots fall from a window, and with how much force they crash down and dent the cobblestones.] It is clear from legal sources that in many towns property owners were held responsible for keeping the streets in front of their premises free of refuse and other obstructions (Robinson 1993: 69–72; Liebeschuetz 2000: 54–7), and it seems likely that a substantial portion of the refuse that was initially discarded in this way was eventually collected and disposed of in a more definitive fashion in some other location.⁸

Excavation inside Roman towns often uncovers substantial undisturbed deposits of refuse that include significant amounts of pottery in various out-of-the-way places that represent more or less enclosed depositional basins, including the substructures of buildings, cisterns, wells, pits, natural declivities, and cul-de-sacs (Remolà 2000: 113–14).⁹ Pits, wells, cisterns, and the substructures of abandoned buildings would have represented hazards of some significance, particularly for children and certain domesticated animals, such as sheep and goats, which might fall into them, and their infilling with refuse would thus have served a beneficial purpose. Not infrequently, these features prove to contain a series of distinct refuse deposits, raising the possibility that they were topped up on a periodic basis as the materials that had been dumped into them decayed, compacted, and settled (Peña 1999: 59).

Pottery and other refuse may also have been discarded on the ground surface in undeveloped lots in and around towns. As an example of this practice one may cite *P.Oxy.* 941, a letter that can be dated to the sixth century, in which the writer complains that a lot allocated to him for the

purpose of brick making, presumably situated somewhere within the town of Oxyrhynchus, was unsuitable for this activity, as it was ὀστρακώδης [*ostrakódes*; full of sherds].¹⁰

The most comprehensive picture of refuse disposal practices across the whole of a Roman settlement comes from Wadi Umm Hussein, the small administrative and residential center for the Mons Claudianus granite quarry, in the Eastern Desert of Egypt, and although the dynamics of refuse discard in this remote and inhospitable location were likely different from those at most other settlements in certain regards, the evidence is worth reviewing in some detail on account of its extraordinary richness. During the period 1987 to 1993 a project was undertaken at the Mons Claudianus complex that involved the documentation of the various cuttings, features, and quarry pieces in the quarry field and a program of surface investigation and excavation at the Wadi Umm Hussein settlement (Peacock and Maxfield 1997; Maxfield and Peacock 2001, 2006). Because the highly compact settlement was occupied for a relatively short period of time and was subjected to comparatively little postabandonment disturbance, it was possible to plan many of the structures more or less in their entirety. In addition, due to the extremely arid environment, the site offered exceptionally good preservation of organic material, and it was possible to recover numerous artifacts manufactured in papyrus, basketry, cord, cloth, wood, and leather, as well as a rich array of archaeobotanical and zooarchaeological specimens. Finally, the recovery of over 9,000 Greek and Latin *ostraca*, many of which bore legible dates, has permitted the development of unusually fine-grained chronologies for dumping activities on some parts of the site.

The Wadi Umm Hussein settlement was occupied, perhaps discontinuously, from a date no later than A.D. 85/86 to at least A.D. 222 (Maxfield and Peacock 2001: 421–55) (Figure 10.3). The heart of the settlement consisted of a small fortress (in its developed phase a square compound measuring ca. 70 m on a side and covering an area of ca. 0.5 ha) situated on the north side of the *wadi* course. This had a single gate in its western wall and contained several one- or two-room residential units, two larger residences, a communal kitchen, a latrine, and a possible guild room, separated by narrow, alley-like thoroughfares. Circa 90 m outside the gate to the SSW was an excavated well that presumably provided the community with the bulk of its water. An approach road ran up to the gate from the west, passing ca. 20 m to the north of the well. To the west of the fortress, to either side of the approach road, was an extensive extramural quarter that included a sanctuary of Serapis, a

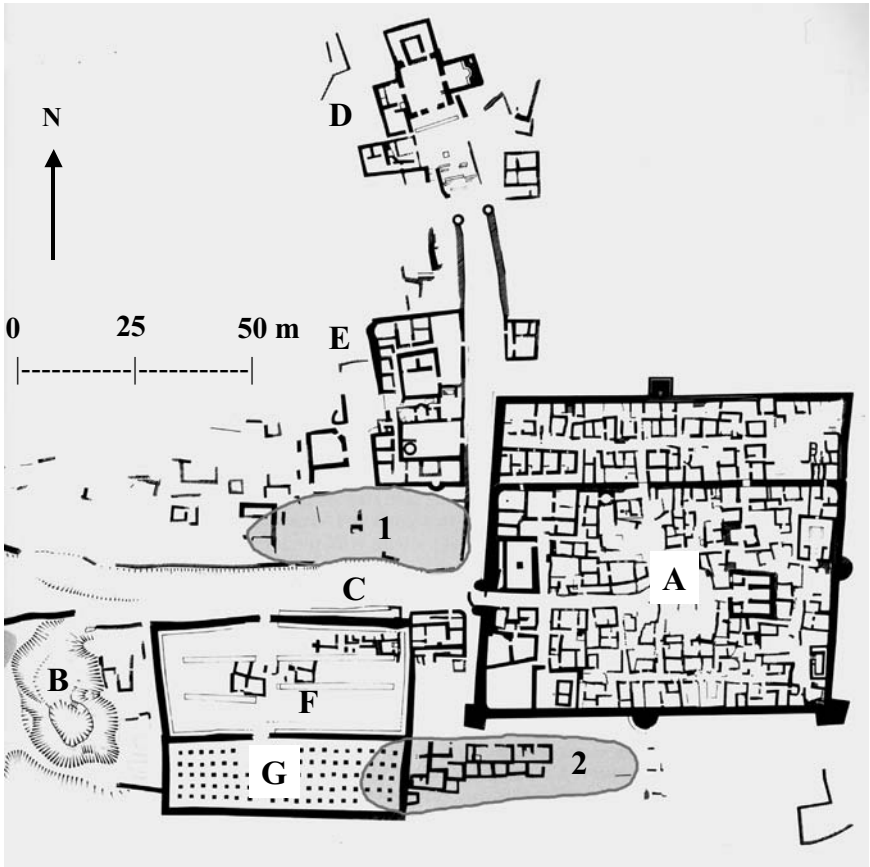


FIGURE 10.3. Plan of Wadi Umm Hussein settlement. After Peacock and Maxfield 1997 fig. 2.3. A: fortress. B: well. C: approach road. D: Temple of Serapis. E: Bath. F: animal enclosure. G: granary. 1: West Sebakh. 2: South Sebakh.

large residential complex with a bath – perhaps the residence for the prefect in charge of the quarry or a *mansio* (guest house) – an enclosure for draft animals with an annexed granary, and several less-well-documented structures that likely served as residences, storage buildings, and/or workshops. Although an *ostrakon* listing ration recipients indicates that at one point during the first or second decade of the second century the quarry community reached a size of 920 individuals, including a garrison of at least 60 soldiers, skilled and unskilled male quarry workers, and women and children – presumably the families of these workers – the residences located inside

and immediately outside of the fortress could have housed no more than a few score individuals at any one time. There is little evidence for residential structures elsewhere in the extended quarry complex, and it remains unclear how it was possible to accommodate a population that at times numbered many hundreds of individuals, if only intermittently and for short periods of time.

In the period extending from the construction of the fortress ca. A.D. 110 through the A.D. 140s it appears that a major portion of the refuse generated by the community was discarded in two areas, one located immediately outside the western half of the south wall of the fortress, and the other situated along the north side of the approach road, resulting in the formation of two enormous middens, which the excavators termed the South Sebakh and the West Sebakh, respectively (Maxfield and Peacock 2001: 443–4, 445–6, 468). The South Sebakh was subject to extensive excavation and can be described in some detail (Maxfield and Bingen 2001: 89, 109–16, 125 fig. 5.25; van der Veen 2001: 214). It has the form of an elongated mound, measuring at least ca. 70 m long in an E–W direction by 18 m wide in a N–S direction. It reaches an elevation of ca. 1.8 m above its surroundings, a figure perhaps not much less than the maximum height that it attained in antiquity. As some portion of this feature's western end was destroyed by the construction of the animal enclosure/granary in A.D. 149 or slightly later, its true extent in an E–W direction cannot be determined. The midden consists of deposits dumped immediately behind (i.e., to the south and southwest of) a set of structures situated immediately to the south of the western portion of the south wall of the fortress, more or less along the northern edge of the area affected by the *wadi* in times of spate. From dated *ostraca* it can be established that the earliest structures in this area were built at roughly the same time as the fortress, that is, ca. A.D. 110, and then added to in two distinct stages, with the first of these probably occurring no earlier than A.D. 113. At some time in A.D. 148 or later the structures were deliberately put out of use, with their upper portions dismantled and the resulting debris deposited inside. Dumping to the south of the structures appears to have commenced immediately upon the completion of their initial construction phase, continuing through A.D. 117/118 or slightly later, followed by what appears to have been a hiatus, resuming in A.D. 135/136 or slightly later and continuing through to the time of the structures' demolition. The refuse in the midden thus appears to have been deposited over a period of ca. forty years (i.e., ca. A.D. 110–50).

As the excavators of the South Sebakh encountered considerable difficulty in recognizing discreet stratigraphic units within the mound, they elected to excavate it in artificial spits. It was, nonetheless, possible to document some discrete refuse deposits within the midden, particularly in cases where these contained a prominent ash component. These deposits were of various sizes and configurations, leading the excavators to conclude that the midden was formed in a gradual fashion through numerous episodes of dumping. The midden contained a wide variety of both organic and inorganic materials. Among the former were ash, presumably from cooking ovens and bath furnaces, animal and plant remains that appear to represent kitchen waste, table waste, and snack food, artifacts in wood, leather, bone, horn, and shell, wooden offcuts, textiles, ropes, basketry, papyrus, and perhaps also fecal matter. The inorganic remains included artifacts in metal, glass, and stone, pottery, and over 4,000 *ostraca*, with pottery the dominant element of this component. In some cases sherds belonging to the same vessel or fragments of a single *ostrakon* were recovered in different parts of the midden and/or at different levels, leading the excavators to conclude that a substantial portion of the material dumped onto the mound consisted of secondary refuse and/or that much of this material was subjected to a significant degree of disturbance subsequent to its deposition. At the same time, the fact that in some instances several related *ostraca* were recovered in proximity to one another suggests that at least some of the material consisted of recently generated refuse that was not significantly disturbed subsequent to its deposition. A substantial portion of the animal remains were disposed of in a fleshed condition, and it seems likely that the rotting food remains present in the midden would have given off an unpleasant stench that must have been noticeable to those living and/or working in the set of structures immediately to its north. This may be reflected in the fact that immediately prior to and presumably in association with the structures' final construction phase a thick layer of sand was laid down over the top of the refuse deposits.

Much less is known about the West Sebakh (Peacock and Maxfield 2001: 443–4, 468). This feature, situated immediately to the north of the access road and separated from it by a set of retaining walls, stretches ca. 110 m along the road in an E–W direction, attaining a maximum N–S dimension of perhaps ca. 15 m.¹¹ No information is available regarding its height. A test trench excavated near the midden's eastern end has shed some light on its history. It consists of refuse dumped over a street perpendicular to the approach road and two structures fronting on its western side that were in

use probably from the first or second decade of the second century through at least A.D. 136. Dated *ostraca* suggest that the refuse that makes up this midden was deposited in the A.D. 130s and 140s. Substantial amounts of refuse were also dumped immediately outside the gate to the south of the access road during this period (the so-called Southwest Sebakh), although the construction of the animal enclosure and granary in A.D. 149 or slightly later has rendered it difficult to establish the nature and extent of this activity (Peacock and Maxfield 2001: 443–4, 468).

Excavations carried out at several points inside the fortress shed interesting light on refuse discard practices in this area (Peacock and Maxfield 2001: 445–9, 456–65; Bingen 1996). The evidence demonstrates that although for the first three decades of its life the fortress was kept largely free of refuse, from the early A.D. 140s significant amounts of material were dumped both into several of the residential structures, putting these out of use, and into the thoroughfares, leading to the progressive rise in the level of their surfaces. In several cases the rise in street level was so great that it necessitated the raising of the threshold blocks of the doorways that opened onto them.

In some cases the presence of dated *ostraca* in the refuse deposits dumped inside residential structures permits inferences to be drawn regarding the nature of the discard behavior that led to their formation. In the case of Fort North 1, Room 1 (Bingen 1996: 33–4; Maxfield and Peacock 2001: 449, 460, 469 fig. 16.1), for example, the series of deposits, which has a *terminus post quem* of A.D. 136, contained five or possibly six *ostraca* dated to A.D. 140/141, A.D. 141/142, or A.D. 142/143 in its lower portion, four *ostraca* dated to A.D. 143/144 in its central portion, and five *ostraca* dated to A.D. 144/145 in its upper portion, which reached to the top of the room's walls. This suggests that this space was completely filled with recently generated refuse over a fairly brief period of time, perhaps no more than three years. Although the earliest deposits in the sequence could have been dumped directly onto the floor of the room by persons either standing inside it or positioned at one of its two doorways – one giving onto it from a room located immediately to its west, and one giving onto it from the thoroughfare situated immediately to its east – the progressive accumulation of refuse eventually would have obstructed both doorways, precluding access to the room, and the deposits that constitute the central and terminal portions of the sequence must have been deposited either by being dumped into the room from above or by being thrown over its walls. This inference is corroborated by the fact that the set of deposits that constitute the central

portion of the sequence dips to the north, as though dumped or thrown into the room from the room situated immediately to its south, and by the fact that both doorways were eventually subject to deliberate blocking (the eastern one in more than one stage), presumably to prevent refuse being introduced into the room from above from spilling out through these openings into the adjacent spaces. Also worth noting in this regard is the fact that one or more of the deposits in the central part of the sequence that dip to the north proved to contain a conspicuous concentration of *amphorae* against the face of the room's north wall, as though these had rolled or slid down the slope when dropped or thrown into the room from the south.

In another case, Fort West 1, Room 1 (Bingen 1996: 34; Maxfield and Peacock 2001: 462), the lower part of the sequence (Layers 9–14) produced three *ostraca* dated to A.D. 140/141 and three dated to 152/153, whereas the middle part (Layers 4–8) produced four *ostraca* dated to A.D. 186, 186/187, 188/189, and 189. This suggests that this room was filled in at least two discreet periods or episodes perhaps separated in time by as much as forty years, with the first of these apparently involving the dumping of refuse generated over a span of ten years or more, and hence very probably the redeposition of material that had originally been discarded in some other location.

Three additional aspects of refuse discard practices inside the fortress are worth noting. First, the fact that in several cases portions of the roofs of structures were preserved *in situ* allowed the excavators to observe that it was a common practice to dump refuse not only inside structures, but also onto their roofs (Maxfield and Peacock 2001: 446). Second, in two instances (Fort West 1, Room 3; Fort Southeast, Room 1), the earliest refuse layer in a room consisted of large pieces of *amphorae*, suggesting that immediately prior to going out of use these spaces were employed for the provisional discard of intact and/or damaged containers (Bingen 1996: 35; Maxfield and Peacock 2001: 448, 464).¹² Third, the communal kitchen and the area around it were found filled with ash deposits, indicating that toward the end of the period of its use and perhaps from substantially earlier, the ash that it generated was discarded by being dumped in and around this facility (Maxfield 2001: 73–4).

The striking change in the locus of refuse disposal at Wadi Umm Hussein that appears to have occurred in or around the A.D. 140s is a point of considerable interest. In all likelihood, the reduction or cessation of disposal in areas outside the fortress, specifically on the South Sebak and West Sebak,

and the intensification of discard inside the fortress (or, alternatively, the discontinuation of the practice of removing from the fortress refuse initially discarded inside of it for definitive discard in some other location) likely reflects a combination of three things: the elimination of several of the residential, workshop, and storage structures located outside the compound, the expansion of the residential space available inside the compound provided by the construction of the so-called Annex – an extension across the whole of the fortress's northern end probably undertaken in the A.D. 140s – and a reduction in the size of the community that came with a scaling back of quarrying operations at this time.¹³ The substantially smaller group of people now occupying a significantly larger amount of space may have availed themselves of the situation to dispose of their refuse by dumping it into the nearest unoccupied structure, with the idea that these spaces could always be cleared out and made ready for occupation as might be required by some future increase in the size of the workforce (Peacock and Maxfield 2001: 446).

This evidence suggests that refuse discard at Wadi Umm Hussein involved a set of practices similar to those included in the list of generalized discard practices presented at the end of the preceding section. These included the provisional discard of broken *amphorae* in abandoned rooms and the definitive disposal of domestic refuse in public thoroughfares and disused spaces inside the settlement and in refuse middens situated immediately beyond the settlement's boundaries. At the same time, it seems likely that the specific approaches to the discard of refuse observed at Wadi Umm Hussein were to some extent atypical of Roman towns. Most obviously, the fact that the community was located in an area remote from other settlements probably meant that there was a greater than normal tendency to reuse and recycle artifacts before discarding them, because the various items of material culture that could not be manufactured locally had to be imported from a considerable distance at substantial cost. The peculiar tradition of reworking *amphorae* to produce tableware vessels attested at Mons Claudianus and also at Mons Porphyrites described in Section 6.6 is presumably an expression of this practice. Also worth noting in this connection is the fact that, because the region in which the settlement is located was unsuitable for agriculture due to its exceptional aridity, little, if any of the refuse generated by its inhabitants would have wound up being disposed of by being spread on the surface of garden plots or agricultural fields as fertilizer.

The inhabitants of rural areas also generated significant amounts of industrial/commercial and domestic refuse. In these areas, however, low population densities, a low standard of living, and a low level of socioeconomic complexity in comparison with towns would have made for smaller volumes (both per capita and per square meter of inhabited area) of less variegated refuse. The relatively large amount of undeveloped space, coupled with the absence of legal restrictions governing refuse discard, would have allowed the inhabitants of rural areas to dispose of the refuse that they generated in the immediate environs of residences, industrial or agricultural establishments, construction sites, etc., in a relatively casual fashion with little risk of interfering in any significant way either with their own or with other people's activities. Finally, the fact that in many cases the loci where refuse was generated lay close to agricultural fields and the fact that animal manure was systematically collected at many farmsteads for use as fertilizer probably meant that a larger proportion of the refuse generated in rural areas wound up being spread over the surface of agricultural fields, mixed in with kitchen ash, human feces, and/or animal manure. Excavation at rural sites regularly uncovers substantial refuse deposits that include considerable amounts of pottery inside features that represent natural depositional basins, including wells, cisterns, pits, fixtures, and buildings.¹⁴ As was the case in towns, it apparently was thought desirable to employ refuse to fill features of this kind. The most comprehensive picture of refuse disposal practices in a rural setting comes from the Villa Regina, a modest farmstead located outside Pompeii. This evidence is discussed in detail in Section 10.5.

10.3 / *The Discard of Pottery in the Context of Pottery Workshops*

As discussed in Section 3.1, pottery workshops normally generated substantial amounts of waster pottery due to mishaps that occurred in the course of the manufacturing process. Some portion of this material was no doubt disposed of by being employed for various recycling or reuse applications on the workshop premises, or by being passed either to individuals, groups, or establishments that employed it elsewhere for some reuse or recycling application or to individuals or groups who collected it for sale to these. Pottery workshops routinely produced substantial amounts of refuse of other kinds, including damaged kiln furniture, kiln ash, and structural debris resulting from the collapse, remodeling, and/or dismantling of kilns, and it seems likely that they regularly disposed of a substantial portion of the waster

pottery that they generated, in some cases along with this other refuse material, by discarding it somewhere either on or off the workshop premises.

Roman archaeologists have shown scant interest in the detailed documentation of pottery assemblages from workshop sites, and there is thus little evidence that would permit one to reconstruct either specific practices or general patterns in the disposal of waster pottery at these establishments. Some of the practices involved in the discard of pottery on workshop premises are here illustrated through the description of two particularly well-documented cases, one an extra-urban workshop that was subject to extensive excavation, the other a cluster of rural workshops that was subject to a program of intensive surface investigation coupled with limited test excavation.

The first of the two cases to be considered is a pottery workshop at Iesi, near Ancona, on the Adriatic coast of Italy. Here, excavations uncovered a substantial portion of a pottery production facility situated on the second terrace of the Esino River, ca. 300 m to the east of the Roman town (Brecciaroli Taborelli 1998) (Figure 10.4). This establishment, which concentrated primarily on the manufacture of Black Gloss Ware, was active during the period ca. 250/240 to 150/140 B.C., with two distinct phases, the first spanning the period ca. 250/240 to 180/170 B.C., and the second the period ca. 160 to 140 B.C. A building identified as a residential structure was constructed immediately to the southeast of the area occupied by the workshop ca. 100 B.C. and remained in occupation until ca. 40 B.C. Waster pottery found in the later part of the site sequence indicates that following the conclusion of its second phase and prior to the construction of the residential building, the workshop was moved to another location somewhere in the immediate vicinity of the excavated area, where it remained in operation until ca. A.D. 40. Although it is impossible to infer much about the overall layout of the workshop from the site publication, this does provide descriptions of several deposits of waster pottery recovered in and around the establishment, permitting a fairly detailed reconstruction of the practices involved in its on-premises discard. Although these descriptions provide detailed information regarding the specific vessel forms represented and the number of examples of each, they generally say little about the physical condition of the pottery, and it is thus difficult in most cases to determine the nature of the production defect that led to the discard of any specific vessel.

The remains associated with the workshop's first phase consisted primarily of pits and other negative features. Among these were three cuttings,

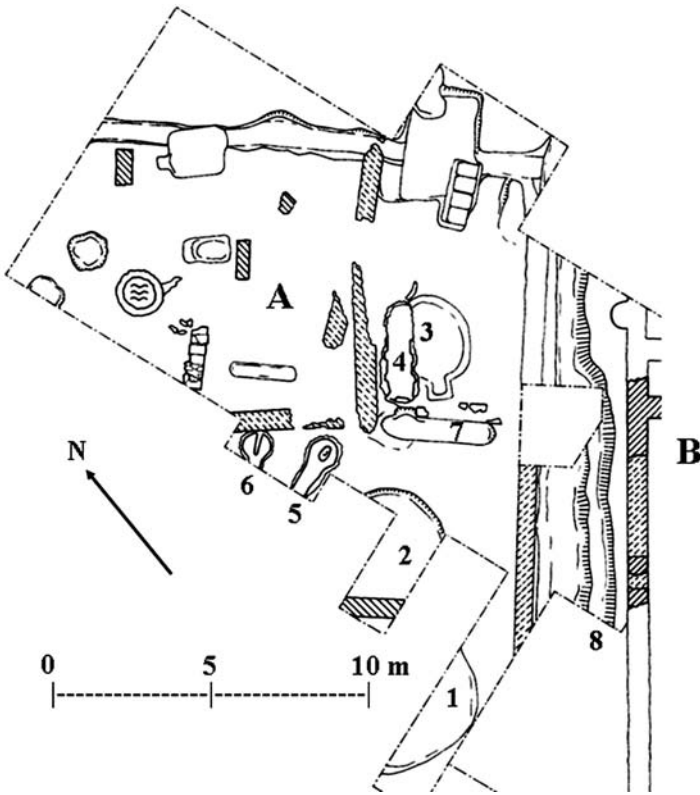


FIGURE 10.4. Plan of pottery workshop at Iesi. After Brecciaroli Taborelli 1998: fig. 4. A: pottery workshop. B: residential structure. 1: Pit E79. 2: Pit E80. 3: Pit E81. 4: Kiln 1. 5: Kiln 2. 6: Kiln 3. 7: Pit E82. 8: Channel E78.

termed E79, E80, and E96, that the excavator identified as clay extraction pits (Brecciaroli Taborelli 1998: 17, 20–21, 48–55). Each of these proved to contain a unitary fill consisting of carbonized material – presumably kiln ash – and pottery. In all three cases the pottery in these fills – apparently largely or exclusively waster pottery produced by the workshop – consisted primarily of sherds deriving from vessels manufactured during the period ca. 250–150 B.C., with a small number of sherds from vessels manufactured during the first half of the third or the late fourth century. In the view of the excavator, these deposits were created gradually over the entire span of the workshop's first phase. Also belonging to this phase was a circular pit of uncertain origin, termed E81 (Brecciaroli Taborelli 1998: 23–4, 56).

This contained a unitary fill consisting of a dark matrix with greenish stains and pottery. The pottery in this fill again consisted primarily of sherds from vessels manufactured during the period ca. 250–150 B.C., along with a small number of sherds from vessels manufactured during the first half of the third or the late fourth century. It displayed a notably high degree of vessel completeness and apparently consisted largely or exclusively of waster pottery produced by the workshop. The excavator believes that this fill was deposited over a brief span of time near the end of the workshop's first phase, that is, around 180–170 B.C. A fifth negative feature associated with this phase was a rectangular cutting of uncertain origin, termed E94 (Brecciaroli Taborelli 1998: 27, 58). This contained a fill consisting of gravel and pottery. The pottery, composed for the most part of sherds from over-fired vessels, was manufactured during the period ca. 250–150 B.C. Stratigraphic considerations indicate that this fill was deposited at the very end of the phase, hence around 180–170 or perhaps slightly later. Other negative features associated with this phase proved to contain fills consisting primarily of gravel and/or structural debris, rather than waster pottery.

The features belonging to the workshop's second phase included three small updraft kilns (Brecciaroli Taborelli 1998: 31–3). As described in Section 9.3, inside one of these was found a substantial amount of waster pottery that appears to have been recycled as fill in its construction. Also belonging to this phase was an oblong pit, termed E82, that was perhaps a cut left by the dismantling of a production-related fixture of some kind (Brecciaroli Taborelli 1998: 27, 61). This contained a unitary fill consisting of gravel and pottery that appeared to represent a set of over-fired vessels deriving from a single kiln load. The excavator believes that this fill was deposited ca. 160/150 B.C.

Turning to the remains belonging to the site's residential phase, a drainage channel, termed E78, proved to contain two distinct deposits, a lower fill consisting of pottery in a matrix of dark, ashy earth and an upper fill consisting of structural debris, including mud brick, clay, and tiles (Brecciaroli Taborelli 1998: 21–2, 66–8). The pottery in the lower fill consisted of a mix of both locally and nonlocally manufactured vessels dating to the period ca. 120–110 to 50–40 B.C. In all likelihood, this material consisted of pottery used and discarded by the inhabitants of the residence, together with waster pottery and kiln ash deriving from the relocated workshop.

The evidence summarized here indicates that the workers at this establishment disposed of substantial amounts of waster pottery by dumping it into

nearby pits and cuts of various sorts, presumably with a view to eliminating these hazardous and inconvenient features, while at the same time avoiding the creation of additional hindrances to workshop operations. The bulk of this material appears to have been dumped into clay extraction pits located immediately adjacent to the workshop, along with kiln ash. This activity probably involved the ongoing discard of groups of materials of modest size into one or more of at least three pits over a period of several decades, leading to the gradual infilling of these features. It cannot be excluded, however, that this activity took the form of periodic clean-up operations that saw the collection of waster pottery and kiln ash that had been discarded elsewhere, perhaps on the surface in and around the kilns, with the large quantity of mixed materials gathered in this way dumped into one or more of the pits, resulting in their sudden, or at least episodic, infilling. Small, more homogeneous groups of waster pottery were also dumped into other, generally smaller negative features, presumably shortly or immediately after their loss to some production defect or other, along with gravel, which may have been spoil resulting from clay digging operations. It is possible that the workshop personnel tended to produce and fill these smaller negative features at times when they knew that the workshop was due to be reconfigured or relocated. The negative features into which misfired pottery and kiln ash were dumped probably lay just a few steps from the kilns in which these materials originated. If, for example, the overfired pottery from the fill in pit E82 derived from one of the three kilns that belong to the same phase as this feature, then the vessels in question wound up being disposed of no more than ca. 5 m, and perhaps as little as ca. 1 m from the mouth of the kiln in which they were fired.

The second case to be considered is the Alice Holt site, located ca. 17 km to the southeast of Silchester, in south central England. A cluster of workshops at this site, together with additional workshops at Malthouse Farm, ca. 1 km to the southwest, Baigents Bridge, ca. 1 km to the southeast, and Farnham, ca. 5–6 km to the northeast, constituted a rural nucleated industry that produced a distinctive class of utilitarian ware over a span of time extending from ca. A.D. 60 to ca. A.D. 420. The site consists of a cluster of production refuse middens in the form of low mounds that are spread over an area of ca. 20 ha on the left (east) bank of the Blacknest, a small tributary of the River Slea. During the period 1971–9 a program of research was undertaken at the site that involved the mapping of the production refuse middens, the collection of surface samples from these, the gradiometer survey of a small

number of the middens, the test excavation of one midden, and the study of materials recovered in the partial excavation of another of the middens that had been carried out some years earlier (Lyne and Jeffries 1979).

The researchers who undertook this work were able to identify eighty-one more or less discrete production refuse middens and, in most cases, to determine the approximate horizontal extent and maximum depth of these features (Lyne and Jeffries 1979: 5–9). Using standard algorithms they then derived estimates for the volume of the middens for which they had been able to obtain both horizontal extent and depth measurements (Lyne and Jeffries 1979: 13). Although most of these features had an estimated volume of well under 100 m³, several had figures in the hundreds of cubic meters range, and four yielded figures of more than 1,000 m³, with the largest of these being 2,831 m³. Because Alice Holt pottery has been recovered in dated contexts at numerous sites in southern England, the researchers were able to assign the various forms produced in the Alice Holt workshops to five general periods of from 50 to 80 years duration – Period 1 (A.D. 60–150), Period 2 (A.D. 150–220), Period 3 (A.D. 220–270), Period 4 (A.D. 270–350), and Period 5 (A.D. 350–420). By applying this scheme to the surface materials that they collected at the site, they were able to determine the one or more periods during which each of the production refuse middens had been deposited.

Several of the more well-preserved middens displayed a horseshoe shape, and in some cases gradiometer survey revealed the presence of a kiln in the depression located at the midden's center (Lyne and Jeffries 1979: 13). The test excavation of one of the middens revealed that it was composed primarily of waster pottery, ash, charcoal, and sand. The charcoal was presumably partially combusted fuel, whereas the sand may have derived from sod employed to build the superstructure of the kiln or been a smothering agent that was dumped onto the kiln during the cooling phase (Lyne and Jeffries 1979: 12). The middens were presumably formed by repeated episodes of raking waste material away from the mouth of the kiln and around to its sides after the conclusion of a firing (Lyne and Jeffries 1979: 13).

By dividing the estimated volume of each midden by the estimated span of time over which it was deposited, the researchers were able to obtain estimates for the cubic meters of midden produced per year of activity by period (Lyne and Jeffries 1979: 13). These figures ranged from a low of 25.0 m³ for Period 1 to a high of 77.5 m³ for Period 5. The researchers

were also able to obtain an estimate for the weight of pottery per cubic meter of midden, arriving at a figure of 54.4 kg/m³ (Lyne and Jeffries 1979: 14). A reasonable mean vessel weight figure for the forms produced by the Alice Holt workshops is 0.9 kg, or, if one includes a somewhat uncommon large storage jar form, 2.7 kg. The figure for weight of pottery per cubic meter of midden is thus the equivalent of ca. sixty vessels or, in the alternative case, ca. twenty vessels (Lyne and Jeffries 1979: 13–14). The researchers assumed that a reasonable amount of waste for one kiln would be on the order of ca. 30 m³ per annum, or the equivalent of either 1,800 or 600 vessels, apparently basing this inference on assumptions regarding what they viewed as a plausible firing loss rate.¹⁵ If one accepts this figure as a reasonable estimate, it follows that many of the smaller middens represent no more than a single year's firing activity, and the largest of these features no more than ca. 45 years of activity (Lyne and Jeffries 1979: 14). The figures for cubic meters of midden per year of activity by period, even if substantially on the low side due to the researchers' inability to take into account wasters deposited in negative features, waster pottery dispersed away from the site, etc, suggest that the segment of the industry located at the Alice Holt site probably involved the operation of no more than three kilns at any one time and provided employment for only a handful of individuals.

This evidence indicates that the potters at Alice Holt generally made only the minimum effort necessary to dispose of misfired pottery and kiln ash, simply shifting this material around to the sides of the kiln, where they left it to accumulate. This was presumably because it was easier for the potters to build a new kiln in a different location once this material had come to represent an obstacle to operations, or because the tendency of the kilns to collapse after a limited number of episodes of use obliged them to replace these fixtures with a certain degree of frequency anyway.

In many cases pottery workshops located inside towns would not have been able to adopt the approaches to the on-premises discard of waster pottery attested at the Iesi and Alice Holt workshops. Because probably in most cases these establishments employed clay obtained from locations situated outside the town, they would not have enjoyed immediate access to sizable negative features into which they could have dumped large amounts of refuse. Further, because they were situated in developed areas, where land was both scarce and relatively expensive, these establishments would not have enjoyed the same freedom as did suburban and rural workshops to

remodel their facilities and/or to relocate when the accumulation of refuse came to represent a hindrance to operations. Establishments of this kind were thus presumably obliged to dispose of the bulk of the waster pottery that they generated by arranging for it to be collected by individuals who wished to employ it for some recycling or reuse application, or by discarding it, often along with damaged kiln furniture, kiln ash, and structural debris, in one or more off-premises locations. Although this may have resulted in the formation of sizable dumps consisting primarily of pottery production refuse either inside the built-up area of a town or immediately beyond its margins, it seems likely that in many cases this material would have been discarded in middens that received refuse from multiple sources, and thus wound up being mixed in with other types of refuse. As an example of this approach to the discard of waster pottery, one may cite the deposit consisting of domestic refuse and waster pottery recovered in a clay extraction pit located immediately outside the wall of Tarragona that was noted in the previous section.

10.4 / *The Discard of Pottery in the Context of Wholesale/Storage and Retail Facilities for Pottery*

Pottery damaged during distribution to the extent that it could not be employed for its prime-use application would have included both vessels damaged during transport and vessels damaged while being held in storage at either a wholesale or retail facility. Pottery damaged to this extent during transport likely would have been disposed of by being dumped along the margin of a road or trail, or into or at the margin of a waterway or harbor (Gianfrotta 2000: 27). One should imagine, indeed, that the crews of merchantmen carrying consignments of pottery made a regular practice of jettisoning vessels damaged in the course of a voyage when they made port, to clear the hold of what had become worthless cargo, while at the same time avoiding any possibility of being held liable for paying the *portorium* [harbor tax] for these vessels. Pottery damaged while being held at a wholesale or retail facility was likely disposed of by being passed on to others who wished to employ it for some reuse or recycling application or who wished to sell it those who would employ it for such a purpose, or by being discarded somewhere either on or off the premises.

Although there are no textual sources pertaining to the discard of pottery damaged in the course of distribution,¹⁶ there is considerable archaeological evidence for this practice in the form of deposits consisting of groups of

unused vessels recovered in more or less close association with some element of the transport system, a wholesale/storage facility, or a retail facility.¹⁷

A good illustrative example of a deposit of this kind comes from La Nautique, a harbor site in southern France, ca. 4 km from the important Roman port at Narbonne. Here, excavations uncovered a ditch filled with ca. 300 kg of pottery, consisting almost exclusively of unused vessels of South Gallic *Sigillata* from the production center of La Graufesenque (Fiches, Guy, and Poncin 1978; Rhodes 1989: 51). The deposit, which includes at least 514 vessels, represents a highly complete and strikingly homogenous group of materials, and in some instances two or three identical plates or bowls were found stacked together. The vessels bear a total of 422 stamps representing fifty-three different potters, on the basis of which the deposit can be dated to the A.D. 50s or 60s. Geographical considerations suggest that the cluster of ports centered on Narbonne served as the principal point of embarkation for South Gallic *Sigillata* bound for distribution to the Mediterranean market. Thus, although the specific context of this feature is not clear, it seems all but certain that the materials that make up the deposit represent vessels damaged either in the course of transport from La Graufesenque to La Nautique/Narbonne, or while being stored at La Nautique awaiting further distribution.

10.5 / *The Discard of Pottery in the Context of Wholesale/Storage and Bulk Retail Facilities for Foodstuffs*

The distribution of foodstuffs and other items packaged in *amphorae* sometimes involved their transfer from the containers in which they were being held to other containers. Transvasing operations of this kind presumably occurred at wholesale/storage facilities and retail facilities, the former often located at important transshipment points, and would have generated large numbers of empty *amphorae* that needed to be disposed of by some means or other. These establishments could have disposed of empty *amphorae* by reusing them for the packaging of the same or some other substance, by consigning them to *amphora* brokers, who sold them to others who wished to employ them for this same purpose, for some other reuse application, or for some recycling application, by passing them directly to such individuals, or by discarding them either on or off the premises.

In many cases these establishments likely set aside substantial numbers of empty *amphorae* in provisional discard. As an example of this practice one may cite the Casa di Mestrius Maximus/Lupanar of Amaranthus complex

at Pompeii, discussed in Section 5.3. As already described, the excavation of the Lupanar di Amarantus part of the complex uncovered a group of at least ca. twelve to sixteen used *amphorae* stacked in inverted position in the southeast corner of the garden, apparently destined for refilling with a foodstuff of some kind. In the southwest corner of the garden was another group of at least ca. twelve to fourteen used containers, many of which were damaged, that had been left in a less regular arrangement. The containers in this second group were presumably *amphorae* that could not be refilled with foodstuffs, due in some cases to the fact that they had been damaged in the course of transport, opening, or emptying, and had been set aside for some other reuse application, recycling, or discard.¹⁸

To date, only a handful of deposits consisting of *amphorae* discarded after having been emptied of their content in the course of distribution have been identified. This suggests either that this was a fairly uncommon practice, or, more plausibly, that the containers emptied in this way were regularly subject to systematic reuse or recycling and/or were normally disposed of by being dumped onto middens that received refuse of various kinds from multiple sources. The classic example of a deposit of this kind is, of course, Monte Testaccio, at Rome. Also at Rome, a series of fill layers deposited in connection with the construction of the Forum Transitorium during the period A.D. 81–96/98 proved to contain a distinctive array of *amphorae*, lamps, and tableware that led the excavators to surmise that they consisted in large measure of redeposited refuse deriving from establishments for the sale of foodstuffs and pottery shops (Morselli and Tortorici 1989: 216, 237, 272, 276–9; Panella 1992: 196; Rizzo 2003: 15, 23, 169). Elsewhere, according to Cunliffe, excavations carried out at both Toulouse and Chalon-sur-Saône [Cabilonnum] uncovered large deposits of Italian wine *amphorae* – presumably Dressel 1s – that were apparently discarded when the wine that they held was transferred to containers of some other kind in the course of its distribution into the interior of Gaul (Cunliffe 1987: 167). In Britain, the existence of deposits of this kind has been conjectured for both London (Davies 1993: 140) and York (Monaghan 1997: 974).

Surface investigations undertaken at Monte Testaccio from 1968 into the 1970s, followed by a program of excavation carried out during the period 1989–92, produced a wealth of evidence regarding the practices that lay behind the formation of this unique archaeological deposit, and this information is worth reviewing in detail here (Rodríguez-Almeida 1984:



FIGURE 10.5. Monte Testaccio. Left: aerial view. Brizzi 1973: 289. Right: detail of surface. Photo: JTP.

107–274; Blázquez Martínez, Remesal Rodríguez, and Rodríguez Almeida 1994; Blázquez Martínez and Remesal Rodríguez 1999, 2001a).¹⁹ This feature, an immense artificial mound composed almost exclusively of olive oil *amphorae*, is located in the Emporium district, the city's principal river port from the second century B.C. to the end of the empire. It lies immediately to the south of the site of the Horrea Galbana, the warehouse that served for the storage of state-owned goods, and presumably consists largely of oil *amphorae* stored at this facility that were discarded after having been emptied of their content. The mound, which has a roughly triangular shape, rises to a maximum height of ca. 36 m above its surroundings, with a perimeter of 1,490 m, a surface of 22,000 m², and a volume on the order of 580,000 m³ (Rodríguez-Almeida 1984: 109, 118) (Figure 10.5).

Thanks to the large number of datable stamps and *tituli picti* recovered at Monte Testaccio, it has been possible to reconstruct the formation of the mound in some degree of detail (Blázquez Martínez and Remesal Rodríguez 2001b: 35 fig. 3, 41–3). Dumping was carried out over a span of time stretching from perhaps as early as the late first century B.C. to the A.D. 260s. This was undertaken in a controlled fashion, suggesting that it was carried out under the supervision of an administrative authority of some sort, presumably the *praefectura annonae*, the office in charge of the *annona urbis*. The vast bulk of the *amphorae* discarded on the mound belonged to just three different classes of oil containers – the Dressel 20, the African 1, and the Tripolitanian 2/3. In most of the deposits sampled in the program of excavation, which

dated to the period ca. A.D. 140–250, fragments of Dressel 20s accounted for ca. 80–100 percent of all *amphora* fragments by weight (Rodríguez-Almeida 1994a: 22–4; Remesal Rodríguez 1994a: 137–42; Blázquez Martínez 1999: 15; Blázquez Martínez and Remesal Rodríguez 2001b: 38–9).

The mound is composed of two sections, an eastern platform, consisting of materials dumped during the period through the middle decades of the second century, and a western platform, consisting of materials dumped from the middle decades of the second century through the A.D. 220s. At this point dumping operations shifted back to the eastern slope of the eastern platform through to the time of their termination some three or four decades later. Excavation along the western face of the eastern platform uncovered the remains of a retaining wall formed of nearly intact *amphorae* (Blázquez Martínez and Remesal Rodríguez 2001b: 13–14, 18–27 plates 8–26, 36–7 figs. 36–7, 41). This feature, dating to the A.D. 150s, was constructed by creating a preparation consisting of a layer of very large Dressel 20 sherds and then placing a group of Dressel 20s atop this in a line running northwest to southeast. These containers, which had had their bottoms broken open and had been filled with sherds in order to help anchor them in place, were set in an oblique position, with their mouths pointing toward the outside of the mound (i.e., to the southwest) and down. Sherds were then dumped behind (i.e., to the northeast of) this wall until they reached a depth roughly equal to its height, that is, ca. 30 cm, at which point a new preparation layer was laid down and a new wall was constructed above and set back slightly from the first (i.e., to its northeast). At least four such walls were constructed in sequence, creating what must have been a reasonably stable, sloping face at least ca. 2.5 m high. Traces of what may be a second feature of this kind were also uncovered in the excavation in this area, suggesting that this side of the mound was developed in a stepped arrangement, with two such faces separated by a terrace ca. 8–9 m wide. Also encountered in the excavations were layers ca. 50–60 cm thick composed in large part of relatively small sherds of African 1 and Tripolitanian 2/3 *amphorae*. These may represent deposits laid down as treading surfaces or paths with a view to facilitating the movements of those responsible for dumping operations (Rodríguez-Almeida 1994a: 24–5; Remesal Rodríguez 1994b: 103–10; Revilla Calvo 2001: 373). There also occur lenses of *amphora* sherds mixed with calcareous material, suggesting that lime was sometimes spread over the top of a deposit, presumably to reduce the stench given off as the oil absorbed into the walls

of the vessels turned rancid (Rodríguez-Almeida 1984: 113–16; Blázquez Martínez 1999: 14).

In some cases Dressel 20s have been recovered on the mound complete or nearly so, broken into just a few very large sherds, and with a distinctive rectangular gouge at the junction of the neck and shoulder more or less even with the lower handle attachment. These appear to be vessels that were deliberately broken by a pick blow after having been deposited on the mound intact (Blázquez Martínez 1999: 14). Sherds of African 1 and Tripolitanian 2/3 *amphorae*, on the other hand, sometimes occur packed inside large sherds of Dressel 20 *amphorae* or in small, cone-shaped piles. This suggests that in some cases examples of these two classes were broken down into sherds before being carried up onto the mound for discard (Blázquez Martínez 1999: 14, 23 fig. 12). Remesal Rodríguez, noting that an empty Dressel 20 weighs roughly one-quarter the normal load for a pack horse or mule, has speculated that horses and/or mules were employed to carry intact examples of this class up onto the mound for discard in groups of four, while suggesting that examples of the African 1 and Tripolitanian 2/3 were broken down elsewhere, with the resulting sherds then brought up onto the mound for discard by horses and/or mules equipped with panniers (Remesal Rodríguez 1994a: 142; Blázquez Martínez and Remesal Rodríguez 2001b: 14).

Rodríguez-Almeida has estimated the total amount of oil held in the *amphorae* discarded at Monte Testaccio, arriving at a figure of roughly 375,000 metric tons (Rodríguez-Almeida 1984: 116–19). This is the equivalent of 41,000,000 hectoliters (hl), which, if apportioned over a period of 270 years, comes to a mean of ca. 150,000 hl of oil per annum. That the containers that make up the mound represent packaging for oil brought to Rome under the auspices of the state – presumably in large measure for the oil dole, that is, the program for the subsidized distribution of oil to a large segment of the urban populace – is confirmed by the *titulus pictus* that occurs on a significant portion of the Dressel 20s recovered there. This text, which consists of four standard components generally referred to by scholars as alpha, beta, gamma, and delta, relates to the packaging and transport operations undertaken in connection with the collection of oil in southern Spain for use by the state (Rodríguez-Almeida 1989: 26–30; Rodríguez-Almeida 1994b: 36–7).

The massive number of oil *amphorae* discarded at Monte Testaccio indicates that a substantial portion of the oil brought to Rome by the state in *amphorae* during the period ca. A.D. 1–260 was transferred to some other

container either at the moment when it was placed in storage at the Horrea Galbana or when it was readied for distribution away from this facility. That at least a modest portion of the oil brought to Rome in the *amphorae* discarded at Monte Testaccio was distributed directly to consumers – presumably recipients of the oil dole – at the Horrea Galbana is suggested by the presence of a fifth *titulus pictus* component, the so-called theta, on a small number of the Dressel 20s that have been recovered there. This *titulus pictus* component, which Rodríguez-Almeida believes was produced subsequent to the arrival of the *amphora* at Rome, appears to document amounts of oil removed from the container on which it occurs, recording this in terms of *heminae*, a unit of liquid measure equal to one-half *sextarius* (0.27 l) (Rodríguez-Almeida 1989: 30). This points to the distribution of oil in quantities that seem more compatible with the disbursal of rations to individual dole recipients or the sale of oil to retail customers than with the sale of oil to wholesalers and/or retailers, or with its distribution to a decentralized network of outlets that might have served for the disbursal of the oil dole.

The preponderance of Dressel 20s in the deposits that make up Monte Testaccio indicates either that the vast bulk of the oil that passed through the Horrea Galbana originated in southern Spain, or that southern Spanish oil was more likely to be transferred to another container for storage and/or distribution than was oil from either Tunisia or Tripolitania. Contemporaneous pottery deposits from Ostia do not display a similar preponderance of Dressel 20s in comparison with African 1s and Tripolitanian 2/3s, suggesting that the second of these two possibilities is more likely to have been the case (Mattingly 1988: 55; Revilla Calvo 2001: 376). This would not be surprising, as the Dressel 20 was a relatively inefficient container in comparison with these other two *amphora* classes, as measured by the ratio of liters of content to kilograms of packaging. Whereas Dressel 20s for which the relevant data are available display efficiency values in the range of 1.96–2.46, Tripolitanian 2/3s for which these data are available show values in the range of 3.12–4.07 (Peacock and Williams 1986: 52). Although no efficiency data are available for the African 1, examples of this container probably had values similar to those attested for the Keay 25, the medium-sized Tunisian oil *amphora* that was its successor. Freed publishes weight values of 11.3 and 11.5 kg for two examples of this class that have capacities on the order of 27.0 and 28.6 l, respectively, for efficiency values of 2.39 and 2.49.²⁰

Perhaps more pertinent to understanding the differential discard practices associated with these three *amphora* classes, however, are the values for the gross weight of a filled example of each. Although Dressel 20s varied in capacity from 59 to 101 l, the standard module had a content of 78–9 l (Peña 1999: 86), the equivalent of 71–2 kg of oil.²¹ Examples with capacities in this range weigh ca. 32.3–35.8 kg (Peacock and Williams 1986: 52), for a gross weight on the order of 103–108 kg. African 1s, in contrast, varied in capacity from 36.5 to 43.3 l (Peña 1999: 88), the equivalent of 32–9 kg of oil. Containers belonging to this class probably weigh in the neighborhood of 11–13 kg, for a gross weight on the order of 43–52 kg. Tripolitanian 2/3s, in turn, vary in capacity from 50.0 to 60.5 l (Peña 1999: 87), the equivalent of 45 to 55 kg of oil. Containers belonging to this class weigh ca. 14.0–17.5 kg, for a gross weight on the order of 59–72.5 kg. On the strength of these data one can observe that although filled African 1s and Tripolitanian 2/3s could have been carried by a single porter, the same would not have been true for filled Dressel 20s. Indeed, a fresco from a warehouse at Augusta Rauricorum depicts two men carrying what is clearly intended to be a Dressel 20 suspended from a *phalanga*, or carrying pole (Martin-Kilcher 1987: Abb. 94; 1994, 520). Also worth noting is the fact that mules, the most common draft animal throughout most of the Roman world, can generally carry a load of up to ca. 90–120 kg, provided that this can be divided more or less evenly into two parts that can be slung on either side of the animal's back (Landels 1978: 172). Although it would thus have been possible for a mule to transport a pair of filled African 1s, and also perhaps two filled Tripolitanian 2/3s, such would not have been the case for a pair of filled Dressel 20s.

These observations suggest that examples of the African 1 and the Tripolitanian 2/3 would have lent themselves to a variety of Type A and Type B reuse applications for which Dressel 20s would not have been considered suitable. Further, as noted in Section 9.1, Dressel 20s would have been relatively difficult to reduce to small sherds due to the thick walls and notable hard fabric generally associated with this class, rendering these containers substantially less suitable for several common recycling applications (Rodríguez-Almeida 2000: 125–6). It thus appears likely that, whatever the specific nature of the oil decanting and repackaging operations carried out at the Horrea Galbana, there was a systematic bias toward the discarding of Dressel 20s and the retention in the systemic context of African 1s and

Tripolitanian 2/3s. Although it must be acknowledged that, as discussed in Section 6.25.2, Dressel 20s would have been favored for reuse as space filler/lightening elements in concrete construction in the Rome area during the period in question, it seems unlikely that this practice would have been common enough to offset the other factors just noted. The relative proportions of these three classes in the various deposits excavated at Monte Testaccio should thus be regarded as reflecting in some significant measure these classes' respective degrees of suitability for various reuse and recycling applications and not be assumed to represent a reliable measure of the relative amounts of southern Spanish, Tunisian, and Tripolitanian oil that were stored and/or distributed at this facility.

10.6 / *The Discard of Pottery in the Context of Residences and Similar Behavioral Loci*

Most of the vessels belonging to several of the functional categories of Roman pottery, including lamps, cookwares, tablewares, and utilitarian wares, probably reached the hands of consumers and were employed for their prime-use applications at residences located either in towns or in rural areas. Vessels belonging to these functional groups would have been employed for similar purposes at several other venues, including bars and restaurants, workshops and other work sites, sanctuaries, meeting facilities for *corpora* and *collegia*, *necropoleis*, ships and boats, and military camps. That this was similarly true of *amphorae* is less certain, because, as discussed in the preceding section, it seems likely that many of these vessels were emptied of their content at a warehouse/wholesale or retail facility for wine, oil, or fish products and disposed of at that juncture by means of reuse, recycling, or discard. Whatever the specific venue where vessels were employed for their prime use application, most presumably reached the end of their prime-use use-life and were retired from use. Because residential groups probably generated only modest amounts of refuse pottery, individuals who required substantial amounts of pottery for some reuse or recycling application probably did not find it worth their while to collect this material from residences. More likely, the bulk of the pottery retired from prime use at residences was disposed of by being employed by the members of the residential group for some reuse or recycling application, or by being discarded, either on or off the premises.

Roman residential groups regularly generated several kinds of refuse in addition to pottery, including human and animal excrement, kitchen ash,

food wastes (including bone and shell), and items of material culture in a variety of both organic (cloth, leather, basketry, wood, bone) and inorganic (glass, iron, bronze, lead, stone) materials. In many cases pottery was probably discarded along with these other kinds of domestic refuse. Pottery that was discarded by residential groups should thus show signs of use, such as breakage, scratching, chipping, and/or abrasion of slip on the interiors and/or the resting surfaces of slipped vessels, and sooting on the exterior surfaces of cookware vessels, and it should generally occur in contexts that also contain other items of domestic refuse commonly preserved in the archaeological record, including animal bone, fragments of glass vessels, and various artifacts in worked bone, iron, bronze, lead, and/or stone.

There is little evidence regarding the ways in which refuse was managed inside Roman residences. A passage by Quintillian (*Institutio oratoria* 8.3.66) refers to the practice of dropping food refuse onto the floor in the course of a banquet. A small corpus of mosaics, examples of the so-called ἀσάρατος οἶκος [*asáratos oîkos*; unswept room] type, which depict food remains of various sorts strewn across a floor, provides indirect evidence of this practice (Moormann 2000: 80–94). With one exception, these pavements are works of the first or second century executed in what were probably dining rooms in houses in Italy and Tunisia. Pliny the Elder (*Naturalis historia* 36.60.184), in discussing mosaics of this type, remarks that refuse of this kind was normally swept up and removed. The excavation of earthen floors in Roman structures of various kinds generally yields sherds, animal bone, and other artifactual materials, although it is usually impossible to determine whether these items constitute part of the makeup of the earthen layer itself, or represent primary refuse that was left on the floor and eventually trodden into it. There is, to the author's knowledge, no evidence indicating the use of portable containers as temporary receptacles for refuse in and around Roman residences, although the employment of *amphorae*, *amphorae* with their tops removed, and *amphora* bottoms as containers for construction debris, as discussed in Section 6.2.2, raises the possibility that this was sometimes the practice. Besides *amphorae*, wooden buckets, casks, and baskets might have been employed for this purpose.

The hearths and ovens in Roman kitchens likely produced substantial amounts of ash, and some of the food wastes and other refuse generated in and around kitchens were likely disposed of together with this material. This assumption is supported by evidence from the Villa Regina, discussed later in this section. Kitchen ash, together with the other refuse that it contained,

might have been dumped onto middens located either on or off the premises or spread over the surface of garden plots and agricultural fields as fertilizer.

A significant portion of the refuse generated by residential groups, including food wastes, pottery, and other items of material culture, was probably thrown into a cesspit (*latrina*, *lacus*) or a manure receptacle (*stercilinum*). As these receptacles were emptied on a regular basis and the night soil or manure that they contained taken elsewhere for disposal, this practice would have amounted to a form of provisional discard. The material deposited inside cesspits was probably either dumped onto refuse middens or spread over the surface of garden plots and agricultural fields, along with the material from manure piles as fertilizer. It seems likely, in fact, that the low-density off-site scatters of pottery and other artifacts that have been documented by field surveys carried out in various parts of the Roman world are due at least in part to the use of night soil, manure, and also kitchen ash as fertilizer (Ault 1999: 556–9).

Roman archaeologists have shown only limited interest in the investigation of cesspits and manure receptacles, and this potentially important source of evidence regarding practices of refuse discard in the Roman world remains largely unexplored (Jansen 1996: 133). Perhaps the most fully documented example of a feature of this kind comes from the so-called CA Site, at Botromagno, near Gravina in Puglia, in southern Italy (Small, Roe, Hayes, Simpson, Guzzetta, MacKinnon, and Monckton 1994). Here, excavations uncovered the remains of an agricultural villa occupied from the middle years of the second century B.C. to the 70s B.C. In the corner of a room adjacent to the villa's entrance was a pit cut into the tufa bedrock, termed Pit F202, which the excavator identified as a probable latrine. This pit, which was unlined, had a mouth ca. 1 m wide, a maximum diameter of ca. 1.5 m., and a depth of ca. 1.5 m (Small et al. 1994: 201–4). It was filled with soft, fine, brown soil characterized by a high phosphorus content that contained a large amount of plant remains, animal remains, and artifacts. These included fragments of charred wood from several different species of trees, 1,853 pieces of animal bone and shell, a wide array of items in worked bone, ground and chipped stone, iron, lead, bronze, glass paste, plaster, and terracotta, 17 coins, 93 kg of tile, and 35.6 kg of pottery. The pottery, which displayed a notably high level of completeness and a notably low level of brokenness, consisted primarily of tableware, lamps, cookware, and utilitarian wares (Hayes 1994). The representation of *amphora* sherds was strikingly low, totaling just 880 g of material, or ca. 2.5% of the pottery. The charred

wood, animal bone, shell, and pottery suggest that a substantial amount of the fill in this pit originated as kitchen waste, whereas the high phosphorus content of the soil is compatible with the interpretation of this feature as a latrine.²² This material was probably deposited over some fairly brief period of time immediately prior to the villa's destruction, which perhaps occurred in 73 B.C. in connection with the war waged against the followers of Spartacus.

Less detailed reporting from other sites corroborates this picture. Jansen, for example, reports that the only excavation of a cesspit that has been undertaken to date at Pompeii yielded pottery and bone (Jansen 1996: 132). The cesspits in the late republican houses at Cosa yielded animal bone and sherds belonging to a variety of different classes of pottery (Bruno and Scott 1993: 38–42, 47–9, 62–3 figs. 17–18, 73–4, 193–200). In England, the excavation of the farmstead at Gorhambury, ca. 1 km to the northwest of Verulamium, uncovered four cesspits of second-century date consisting of a rectangular cutting lined with timber (Neal, Wandel, and Hunn 1990: 46, 58, 68–9). The fill in one of these contained either all or a portion of at least thirty-one ceramic vessels belonging to a variety of different wares (Neal et al. 1990: 183–4).

The practice of discarding domestic refuse onto manure piles is alluded to in a passage in Arrian (*Dissertationes ab Arriano digestae* 2.4.4) attributed to Epictetus, a philosopher of the second half of the first century:

εἴτα σκευάριον μὲν εἰ ἥς οὕτως σαπρὸν, ὥστε σοι πρὸς μηδὲν δύνασθαι χρῆσθαι, ἔξω ἂν ἐπὶ τὰς κοπίας ἐρρίπτου καὶ οὐδ' ἐκεῖθεν ἂν τίς σε ἀνηρείτο:

[If you were a *skeuáron* so worn out that it was impossible to use you for anything, you would be thrown onto the manure pile, and from there no one would pick you up.]

Unfortunately, the precise import of this passage is rendered unclear by the fact that the word *skeuáron* was employed to refer both to a small vessel and, more generally, to an implement of any sort. Although this passage may thus constitute a direct allusion to the discard of pottery onto manure piles, this is by no means certain.

The archaeological literature is almost entirely devoid of detailed descriptions of the gardens and other open spaces that were a common element of residential compounds across the Roman world, and it thus remains

unclear to what extent these areas were employed for either the provisional or definitive discard of domestic refuse. On the basis of the ethnoarchaeological evidence discussed earlier in the chapter, however, one would expect that domestic refuse of various kinds was sometimes dumped in out-of-the-way places along enclosure walls and/or into pits, wells, cisterns, and fixtures of various kinds in these spaces that represented enclosed depositional basins, and that kitchen ash and/or night soil from latrines, along with the pottery, bone, and other refuse that it contained, was sometimes spread over the surfaces of garden plots as fertilizer. These assumptions receive some support from the evidence uncovered in the excavation of the vineyard-restaurant that occupied the northwest portion of *Regio* 3, *Insula* 7 at Pompeii. Here, a pile of sherds that Jashemski identifies as deriving from *amphorae* and various kinds of pots and pans was found adjacent to the enclosure wall that ran along the south side of the premises, in close proximity to a hearth fashioned from an *amphora* top described in Section 6.13 (Jashemski 1979: 230 fig. 340, 232.). This material likely represents refuse generated by food preparation activities carried out on the premises that was piled up in an out-of-the-way location in provisional discard. As noted in Section 9.1, the small size of the sherds in this feature led Jashemski to suggest that this material might have been crushed in preparation for recycling in a pavement. Further, the surface soil in the vineyard at this complex contained a number of cow, horse, pig, and sheep bones, several of which either bore butchering marks or had been split for marrow extraction, clear evidence that food waste was spread over the plot by some mechanism or other (Jashemski 1979: 216–18).²³ Elsewhere, Gelichi, in discussing residences in Roman towns in northern Italy during the late imperial period, states that these lack clear evidence for structures intended to serve for the disposal of solid refuse, noting, however, that the apparent absence of these may represent a problem of archaeological visibility (Gelichi 2000: 17).

To the author's knowledge, the only Roman residence, urban or rural, that has been excavated and published in a such a way as to provide a reasonably coherent and comprehensive view of the refuse discard practices carried out in and around it is the Villa Regina, a modest farm villa located outside Pompeii, 1.4 km to the northwest of the town's Herculaneum Gate. It is for this reason worth considering the villa and the evidence that it presents regarding refuse discard practices in some detail.

Between 1978 and 1980 the villa was excavated in its entirety down to the A.D.-79 phase. Between 1980 and 1983 a sizable portion of the area around

the villa was then excavated down to A.D. 79 ground level and a careful study made of the various features uncovered. Because excavation was not carried below the A.D. 79 phase, De Caro, the excavator, was able to reconstruct the villa's developmental history in only somewhat general terms (De Caro 1994: 117–21). He identified a first phase that he dated to either the late Samnite period (ca. 150–80 B.C.) or the early years of the Roman colony (ca. 80–50 B.C.). He dated a second phase, which he believed established the general layout of the villa as it would exist down to the time of its destruction, to the end of the first century B.C. (ca. 10–1 B.C.). Following the realization of the structures belonging to this second phase the villa was subject to a series of additions and modifications down to the time of the earthquake of February, A.D. 62, and then to a series of repairs, some of which were still in progress in August, A.D. 79.

The villa was notably modest in its construction, decoration, and size, with a footprint of only ca. 450 m² at its maximum development (Figure 10.6).²⁴ It had an irregular plan, consisting of an open courtyard with rooms ranged around its west, north, and south sides. The courtyard, which had a portico around its west, north, and south sides, contained a *cella vinaria* with eighteen *dolia defossa*. Along the west side of the courtyard there were, from south to north, an entry vestibule, a storeroom, a *torcularium*, and a kitchen. Along its north side there were, from west to east, an elegantly decorated room that was perhaps a *triclinium* [dining room] and a hay/grain storage room that communicated with a drying/threshing floor open to the outside of the villa at the villa's northeast corner. At the southeast corner of the courtyard was a cluster of rooms that included a cistern room, a hallway, and three rooms that might have served as *cubicula*. There were, in addition, second story rooms above the ground-floor rooms at the north and south sides of the courtyard. De Caro estimated that at its maximum development the villa may have accommodated anywhere from five to twelve inhabitants (De Caro 1994: 124–5).

The excavation of the area around the villa involved the clearing of an irregular zone that extended outward from the structure to a distance of at least ca. 7 m and as much as ca. 22 m at some points. This revealed a short stretch of what appears to be a public thoroughfare running in an E–W direction at the extreme southern corner of the exposed area. From the eastern end of this section of road an access drive branched off to the north, running in a SE–NW direction, skirting the southeast corner of the villa and passing directly in front of its main entrance. From cavities left by

the decomposition of both vines and vine props it is clear that the areas to the east, north, and west of the villa, the wedge of land lying between the public thoroughfare and the access drive, and the area to the south of the public thoroughfare were all planted with vines. This evidence, together with the presence of the *cella vinaria* and the *torcularium*, strongly suggests that the agricultural activities centered on the villa consisted primarily of viticulture. De Caro, basing his estimate on the capacity of the *dolia* in the *cella vinaria*, conjectured that the villa controlled a farmstead that covered an area on the order of ca. 0.7 to 2 ha (De Caro 1994: 128).

Various forms of evidence suggest that most of the ground floor rooms of the villa were not in use for normal domestic activities when Mount Vesuvius erupted in August, A.D. 79. In the kitchen, the floor and hearth were covered by a layer of ash that would have rendered the room unserviceable, much of the *triclinium* was taken up by stacks of roof tiles apparently being stored there while awaiting use in repair work, and the hallway and *cubicula* were in the process of having their pavements replaced. At the same time, all eighteen of the *dolia defossa* in the *cella vinaria* had their lids sealed in place with a bonding agent containing *pozzolana*, indicating that they were filled with wine at the time of the villa's destruction (De Caro 1994: 68–9). In the *torcularium*, the press had been dismantled and perhaps stored away for safekeeping (De Caro 1994: 37). It may have been employed for pressing the vintage harvested during the autumn of A.D. 78, with the resulting wine presumably then being stored in some or all of the *dolia defossa* housed in the *cella vinaria*, and was perhaps due to be reassembled in the course of the next several weeks in order to process the A.D. 79 vintage. The villa produced strikingly few portable objects that appear to have been in use at the time of its destruction. There were, for example, just four *amphorae* recovered on the premises that might have been employed to hold foodstuffs destined to feed any occupants of the villa. The bulk of the portable objects that were recovered were concentrated in the storeroom adjacent to the main entrance. A small hearth had been built into one corner of this room, presumably to take the place of the unserviceable hearth in the kitchen. It should also be noted that, other than the remains of a cart found in the vestibule, no agricultural tools or equipment were recovered at the villa.

The best explanation for this evidence is that the villa had been so severely damaged in the earthquake of A.D. 62 and/or in some subsequent seismic event or events that it was not occupied at the time of its destruction in

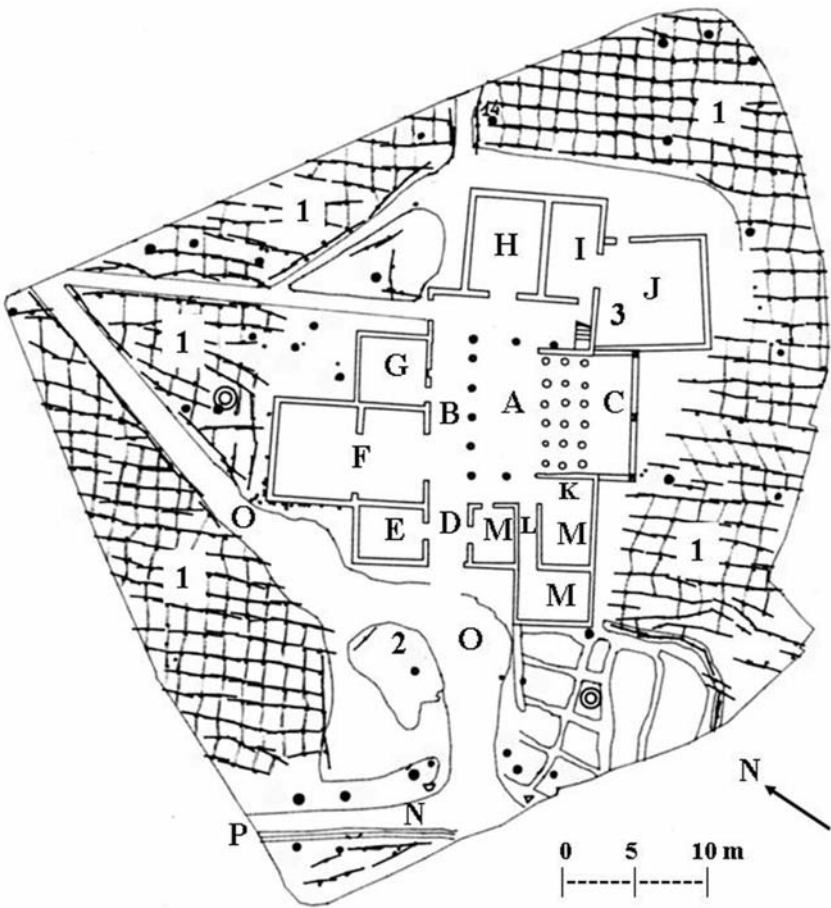


FIGURE 10.6. Plan of Villa Regina, near Pompeii. After De Caro 1994: 97 fig. 28. A: court. B: portico. C: *cella vinaria*. D: vestibule. E: storeroom. F: press room. G: kitchen. H: *triclinium*? I: hay/grain storage. J: drying/threshing floor. K: cistern room. L: corridor. M: bedroom? N: public thoroughfare. O: access drive. P: field enclosure wall. 1: vineyard. 2: midden (approximate location). 3: refuse dump.

A.D. 79,²⁵ but was rather frequented by agricultural workers who labored in the surrounding vineyards, retiring to the villa to prepare and consume their meals, keeping the equipment required for this purpose in the storeroom situated next to the villa's entrance.²⁶ These workers presumably brought their tools with them from some other location, perhaps one or more of the residences located inside the walls of the town.²⁷

The kitchen is of particular importance for the light that it sheds on the practices employed for the discard of refuse at the villa (De Caro 1994: 47–50). This room contained two cooking fixtures: a low masonry hearth near its center and a masonry oven in its northeast corner. On top of the hearth were found two lids for cooking vessels, one in African Cookware, the other apparently in a regional cookware, and two *amphora* spikes and a piece of stone in a triangular arrangement. As discussed in Section 6.15, the spikes and stone must have served as props for cooking vessels. The floor was covered by a layer of ash up to 0.5 m thick in some places that also covered both the upper surface of the hearth and the shelf at the front of the oven. The presence of this layer suggests that during the terminal period of the room's use as a kitchen, the people employing it for this purpose had ceased to remove the ash generated by the use of the hearth and the oven and had begun simply dumping it onto the floor. This practice perhaps reflects the sort of casual behavior that one might expect from persons making occasional use of a heavily damaged and unoccupied residence. The ash deposit eventually must have rendered the kitchen unusable, at least insofar as the cooking of food was concerned, and it appears that it was not being employed for this purpose at the time of the villa's destruction. Two examples of the Dressel 2–4 *amphora* with their tops removed, described in Section 6.5, were found propped up in the angle formed between the oven and the east wall of the room, with the spike of one container inserted into the opening at the top of the other. The upper container held a powdery white substance, whereas the lower one had an aperture cut in its side a short distance below the shoulder. On the floor next to the two *amphorae* was a thin-walled ware beaker that may perhaps have been used to dip the white substance out of the upper *amphora*.²⁸ This evidence suggests that the room was being used as a latrine at the time of the villa's destruction, with the upper *amphora* employed to hold lime that could be sprinkled over feces with the aid of the beaker and the lower *amphora* serving as a urinal.

Of immediate interest is the fact that the ash layer in the kitchen proved to contain several artifacts. These included a portion of a vessel in Italian *Sigillata*, portions of seven cookware vessels, portions of two vessels of what is likely utilitarian ware or tableware, one fragment of a lamp, portions of two glass vessels, two glass buttons, a knife with a broken iron blade and an ivory handle, two bronze rings, and a small bronze appliqué.²⁹ It seems reasonable to infer that most of the artifacts in this layer represent refuse generated by activities carried out in and around the kitchen,

specifically the preparation and consumption of food. The low level of completeness of most of the pottery and glass vessels represented suggests that following the breakage of these vessels their fragments had a complex history, with a substantial portion of these ultimately discarded in some other location.

The only refuse midden identified in the excavated area lying outside the villa was located across the access drive from it, ca. 6–10 m from the main entrance (De Caro 1994: 96). Unfortunately, the site publication contains an extremely brief description of this feature, noting only that it contained fragments of various broken objects and a large amount of burned material. One may conjecture that this feature consisted either of ash with an admixture of artifacts that was removed from the villa's kitchen and/or the storeroom converted for use as a kitchen and dumped in this location, or of general domestic refuse, including a substantial amount of organic material, that was dumped in this location and then burned. The assumption that kitchen refuse was dumped in this general area is supported by the fact that two sherds from the same Italian *Sigillata* vessel represented in the ash layer in the kitchen were found immediately outside the villa, probably ca. 5–15 m to the east of the midden (De Caro 1994: 43). These might have been dumped onto the midden and subsequently displaced by agricultural work, scavenging animals, or children at play.

A dump of refuse, mentioned in Section 9.1, was also found on the southwest corner of a drying/threshing floor at the northeast corner of the villa, immediately outside one of its secondary entrances. According to the site publication, this consisted of *pozzolana*, sherds, and fragments of ceiling stucco (De Caro 1994: 62). It is unclear whether this was refuse that had been placed in this location in provisional discard, with the idea that it would eventually be transferred to some other location for definitive discard, or material that was intended for recycling in connection with the renovation work that was being carried out in several parts of the villa.

Further afield, the excavations uncovered a concentration of refuse, including sherds of pottery, along a dilapidated field enclosure wall that ran along the south side of the public thoroughfare, ca. 18 m to the south of the villa's main entrance (De Caro 1994: 98). This might have been refuse originating at the villa, refuse generated at some other residence situated beyond the bounds of the excavated area somewhere to the south, and/or refuse discarded by persons passing by on the thoroughfare. If refuse from the Villa Regina or a residence situated beyond the excavated area to the

south, it might perhaps represent material that was placed along the wall in provisional discard.

The surface soil of the vineyards that surrounded the villa contained a thin scatter of artifacts (De Caro 1994: 116). This material, apparently more concentrated in some areas than in others, included fragments of Italiote wares, Overpainted Ware, Black Gloss Ware, Internal Red-Slip Cookware, Italian *Sigillata*, Eastern *Sigillata* A, Thin-Walled Ware, regional cookware and utilitarian ware/tableware, lamp, glass vessels, items in iron, items in bronze, including two coins, and items in stone.³⁰ Most of these items match the materials found in the ash layer in the villa's kitchen, supporting the assumption that kitchen refuse was dumped in the midden outside villa's entrance and/or at various points around the vineyards, perhaps as fertilizer, and subsequently scattered over the ground surface by agricultural activities and other processes. Some of the pottery and one of the coins date to the period prior to the villa's earliest phase, however, suggesting that not all of this material was refuse generated by the villa's inhabitants.

The overall amount of refuse recovered inside the villa and in the area immediately around it seems substantially less than one might expect for a residence of this size that was occupied for anywhere from ca. 110 to 230 years (i.e., from 150/50 B.C. to A.D. 62/79), and De Caro has speculated that there may be one or more middens composed of refuse generated by the villa's occupants situated somewhere beyond the boundaries of the excavated area (De Caro 1994: 131).³¹

The evidence from the Villa Regina underscores that in Roman residences it was necessary to remove ash from cooking areas on a regular basis for disposal at some other location, while suggesting that in at least some cases modest amounts of broken pottery would have been mixed in with this material. It further suggests that, in the context of rural residences, the definitive discard of domestic refuse, including pottery, sometimes involved its dumping in middens located within just a few meters of the residence's doorways and/or its scattering in the area surrounding the residence, in some instances perhaps as fertilizer.

The *necropolis* is the only other venue where Roman pottery was regularly used and discarded for which there is substantial evidence regarding discard practices. Here, it is clear from both literary sources and archaeological evidence that pottery employed in rituals concerned with the burial and/or commemoration of the dead was sometimes left on or around the tomb.³²

Turning first to literary sources pertaining to this practice, a passage from the *agrimensores*, *Ex libris Dolabellae* 222.26–28, states: *Fines sepulturarios sive ceneratios sic intellegis, quo vadunt rigores inter possessiones, iuxta sepulturam sive buxus sive etiam cineates aut cacabos invenis aut orcas fractas aut certe integras*. [You can recognize in the following way boundaries associated with tombs or receptacles for ashes, where straight lines run between holdings, because you should find near the tomb either box-trees, or also ashes, or cooking-pots, or broken earthenware vessels, or indeed intact ones.] From this passage one can infer that it was a regular practice to abandon vessels – apparently ones that had been employed in connection with the preparation and consumption of ritual meals – in the areas around tombs. Elsewhere, Propertius (*Elegiae* 4.7.33) refers to leaving a broken *cadus* as an offering on a tomb.

Roman archaeologists have tended to give scant attention to the areas surrounding tombs, and there is, at present, little in the way of archaeological evidence that can be drawn on to illustrate these practices. Excavation of the first century B.C. to third century A.D. necropolis at Sarsina, however, produced remains of what were identified as ritual drinking vessels that had been broken and scattered about the area around the tombs (Ortalli 1987: 180). Similarly, excavations at both the Malafede and Pianabella necropoleis at Ostia have yielded broken pottery scattered around the tombs that appears to have been discarded in connection with ritual activity (Pellegrino 2001: 371).

10.7 / *The Reclamation of Discarded Pottery*

Discarded pottery was presumably reclaimed on a regular basis from both abandonment deposition and archaeological deposits for use in some reuse or recycling application, thereby either being retained in or reentering the systemic context or being converted to a raw material. This might have involved the casual recovery of the odd vessel or vessel part that happened to catch the attention of a passerby, or some more systematic effort. With regard to the latter possibility, it should be kept in mind that since a significant number of the inhabitants of Rome and perhaps certain other cities enjoyed only limited means for supporting themselves, some individuals likely sought to supplement their resources by scavenging useful materials – perhaps including pottery – from refuse middens and selling these to others who could make use of them, much as is the case today in many cities in the third world.

The only evidence for this practice known to the author is the passage in Arrian (*Dissertationes ab Arriano digestae* 2.4.4) discussed in Section 10.6

that refers to the discard onto a manure pile of an item termed a *skeuáron* that is so worn out that no one would bother to reclaim it. As already noted, since *skeuáron* was used to refer both to a small vessel and to an implement of any kind, it is not certain that this passage alludes to the discard and reclamation of pottery. Whatever the case, it does suggest that the reclamation of domestic refuse from discard contexts such as manure piles for reuse was a regular occurrence.³³ Also worth noting in this connection is *Mishnah* Tohoroth Kelim 2.6, which considers whether a defective vessel found inside a potter's kiln is susceptible to uncleanness according to Jewish law, because this presumably envisages the reclamation and use of vessels damaged in the firing process that were abandoned by potters as wasters.

It seems likely that in some cases those who reclaimed pottery from abandonment deposition and/or archaeological deposits selectively collected either large or small vessel parts and sherds, depending on the specific reuse or recycling application for which they required material. Those requiring material for applications requiring large pieces of pottery presumably would have systematically selected fragments of *amphorae* and/or *dolia*, whereas those requiring smaller pieces or pieces that could be more readily reduced by crushing or pulverizing probably would have systematically selected sherds deriving from vessels belonging to the other functional categories.

11

Modeling the Formation of the Roman Pottery Record



*This chapter draws together the observations made in the preceding chapters regarding the eight behavioral practices that governed the life cycle of Roman pottery and the formation of the Roman pottery record. It consists of seven sections. The first of these presents some general observations regarding behavioral practices documented in connection with pottery that may be of broader significance for efforts to understand the dynamics of the use of material culture in the Roman world. The second section offers a set of models that represent in schematic fashion the passage of vessels belonging to various functional categories of Roman pottery through their life cycle, whereas the third presents a set of similar models for selected classes and class groupings of *amphorae*. The fourth section presents a general typology of pottery deposits. The fifth discusses specific effects that the eight sets of behavioral practices had on the nature of the Roman pottery record that are significant from the point of view of pottery research, whereas the sixth considers research that might be carried out in order to improve our understanding of the eight sets of behavioral practices and their effects on the pottery record. The seventh and final section offers some brief concluding remarks.*

11.1 / *Pottery as Material Culture*

Several of the behavioral practices that can be documented in connection with the life cycle of Roman pottery may be of broader relevance to efforts to understand the dynamics of the use of material culture in the Roman world.

Vessels marred by production defects were in some cases repaired by those who manufactured or distributed them with the intention either of correcting the flaw or of masking it from potential buyers. In other cases these vessels were sold as seconds or employed for applications different from those for which they had been manufactured.

Although pottery was generally a low-cost craft good that was widely available throughout the Roman world, vessels – especially high-end products, such as gloss-slipped tablewares – were sometimes provided with inscribed ownership marks, with this practice somewhat more common with vessels that lacked distinguishing characteristics that might have aided in their identification. Vessels that were broken, cracked, or holed were regularly retained in use for the application for which they had been manufactured/acquired or for some similar application where this proved possible. High-end vessels, when broken, were sometimes modified by being cut down or repaired by means of the hole and clamp technique, a complicated and labor-intensive operation that probably required the hand of a skilled craftsman, such as a tinker. Those who continued to use broken vessels may have been viewed with disdain by more affluent neighbors, whereas, in the case of Jews, practices of this kind raised problems having to do with cleanliness under religious law. *Dolia*, extremely large and costly vessels, were carefully cleaned and relined in order to extend their use-life, and, when broken, were often repaired by means of the mortice and tenon technique, a method that, in addition to being a complicated and labor-intensive operation that probably necessitated the involvement of a skilled craftsman, also required a not insubstantial quantity of lead filler. *Amphorae*, although formally regarded as incidental packaging, were sometimes systematically collected after having been emptied of their initial-use content and reconditioned for reuse as packaging containers. At Rome and perhaps some other cities this may have been carried out by individuals who worked as specialized *amphora* brokers. The fact that these were used containers did not compromise their perceived suitability for reuse as packaging containers for some kinds of substances, even, it would appear, in the context of market exchange.

Vessels no longer capable of fulfilling the application for which they had been manufactured/acquired and parts thereof were regularly reused for a wide range of substantially different applications. In some cases this involved the casual, adventitious use of vessels and vessel parts that happened to be at hand (the use of old *amphorae* as containers for construction materials, the use of sherds as props or supports), whereas in others it involved the careful modification of vessels or vessel parts to render these suitable for some specific purpose (e.g., the removal of the top and/or bottom of an *amphora* for use as an element in a geotechnical or hydrogeological feature, the removal of an *amphora* top for use as a libation conduit, the splitting of an *amphora* into halves for use as a sarcophagus, the reworking of a sherd to form the blank

for an *ostrakon* or for use as an *amphora* stopper). In some cases vessels and/or vessel parts were systematically and intensively reused for an application different from that for which they had been manufactured/acquired (e.g., the reuse of Dressel 20 and Dressel 23 *amphorae* as lightening/fill elements in concrete construction), and in some cases practices of this sort were so widespread they may have satisfied a significant portion of the demand for objects intended to fulfill that particular function (e.g., the reuse of *amphorae* as water jars and sarcophagi, the reuse of cookpots as ossuaries, the reuse of *amphora* spikes as props for cooking vessels, and the reuse of *amphora* bottoms as fish nests or planters), reducing or eliminating altogether the need to manufacture objects specifically for that purpose. Although most of these reuse applications can be thought of as utilitarian, some were decorative in nature (e.g., the use of vessels as decorative elements in building facades, and the manufacture of tokens from sherds of gloss-slipped tableware bearing relief decoration).

Substantial amounts of refuse ceramic, probably including pottery, were recycled for various construction applications, such as the construction of concrete pavements and waterproof linings, and the collection and processing of the materials employed for these purposes must have required the investment of very substantial amounts of both time and effort. It seems possible that in the interest of efficiency construction entities developed fixed arrangements to collect refuse pottery from establishments that generated large quantities of this on a regular basis, such as pottery workshops, facilities for the storage/distribution or sale of pottery, and facilities for the storage/distribution or sale of wine and olive oil. Alternatively, individuals or groups may have collected these materials from households or establishments of this kind or scavenged them from refuse middens for sale to construction entities.

A substantial portion of the vessels that were retired from use for the purpose for which they had been manufactured/acquired thus did not make their way directly into the refuse stream but rather were employed for some reuse application or were recycled as a raw material. In some cases vessels and vessel parts were deposited in provisional discard in a location close to the point where they had been used or stored so that they could eventually be either reused/recycled or transported to some more distant location for definitive discard. Given the apparent intensity with which refuse pottery was recycled for various construction-related applications, it seems possible that significant amounts of refuse pottery were scavenged from refuse

middens either by construction entities or by individuals or groups who collected this material for sale to construction entities.

Finally, although the evidence is, on the whole, too scanty to document this point in a satisfactory degree of detail, it does indicate that there were significant geographical and chronological variations in many of these practices.

11.2 / *Modeling The Life Cycles of the Functional Categories of Roman Pottery*

It is possible to draw together the observations presented in Chapters 3 through 10 to formulate a generalized model for the passage through the life cycle of the vessels belonging to each of the six functional categories of Roman pottery. Models of this kind are here presented in the form of a set of seven flow diagrams based on the flow diagram representing the general life cycle of Roman pottery presented in Chapter 1 (Figure 1.2). These include a flow diagram for each of the following groupings of vessels: *dolia*, *amphorae*, lamps, and cookwares distributed beyond their locale of manufacture, utilitarian wares distributed beyond their locale of manufacture, tablewares distributed beyond their locale of manufacture, lamps and cookwares not distributed beyond their locale of manufacture, and utilitarian wares and tablewares not distributed beyond their locale of manufacture. These diagrams, which embody a quantitative component and, in some cases, a geographical component, are meant to suggest in very general terms the individual and combined effects that the eight behavioral practices considered in the preceding chapters had on the passage through the life cycle of pottery belonging to the grouping in question and the role that they played in determining its incorporation into the archaeological record. In the absence in most cases of detailed evidence regarding the incidence of the various practices taken into account, the quantitative element of these diagrams is in substantial measure conjectural.

The diagrams in question were drawn up employing conventions somewhat different from those utilized to produce the general flow diagram for the life cycle of Roman pottery presented in Chapter 1. In this case, each diagram simulates the passage through the pottery life cycle of a hypothetical group of two dozen vessels. Although employing a larger set of vessels – e.g., 100 – would permit the elaboration of a more nuanced model, this more schematic approach was chosen in order to underscore the conjectural nature of this exercise. In the diagram the number of vessels from the

original group of twenty-four affected by a particular practice is indicated beside the label identifying the arrow representing that practice. The line weight of each of the arrows varies in correspondence with this value in order to emphasize the differences in the portion of the initial group of vessels subjected to each practice. For each arrow associated with a value greater than four vessels the line weight employed is equal to one-quarter of that value (e.g., a value of twenty-four vessels is represented by an arrow with a line weight of 6), with a line weight of 1 employed for all values of four vessels or less. Two general considerations governed the selection of the values assigned to each of the practices included in a diagram:

1. Each practice judged to be behaviorally significant was assigned a minimum value of one vessel.
2. The individual values for all vessels shown exiting the systemic context were set so that their sum was equal to the number of vessels shown entering the systemic context.

The latter consideration means that the values assigned to the one or more instances of discard and recycling represented in a diagram add up to twenty-four vessels in all cases except those in which one vessel is shown being reclaimed from the archaeological context for reuse, in which case they total twenty-five vessels. The specific value assigned to each practice was determined by considering the proportion of a group of vessels judged likely to have been subjected to that practice, with the several figures included in a diagram adjusted upward or downward to arrive at the most plausible-seeming overall arrangement.

Maintenance has been replaced by separate indicators for the two distinct repair operations subsumed under this practice, namely, filling/patching and bracing, as the inclusion of these in certain of the diagrams served to highlight differences between the life cycles of the different functional categories. The upkeep operations subsumed under maintenance (cleaning and resurfacing) are not represented, as they do not serve to emphasize distinctions of this kind.

The line for use-life has been replaced with one representing prime-use use-life, with the length of this line and that of the arrow representing prime use made to vary in correspondence with a rough estimate for the mean prime-use use-life of vessels belonging to the functional category or pair of functional categories represented in the diagram. The value employed is indicated beneath the prime-use use-life line.

Finally, the four diagrams representing groupings of vessels distributed beyond their locale of manufacture have been provided with a geographical component. This consists of an indication beside the arrow relating to each practice that served to transfer vessels and/or vessel parts from the systemic context to either the archaeological context or the raw material state of the general categories of locales where this transfer might have occurred. Four different categories of locales are recognized:

Locale 1 = locale of manufacture.

Locale 2 = locale intermediate between the locale of manufacture and that of prime use.

Locale 3 = locale of prime use.

Locale 4 = locale different from Locales 1, 2, and 3.

Although the seven diagrams are for the most part self-explanatory, it may prove helpful to indicate some of the assumptions involved in their elaboration.

Dolia (Figure 11.1): *Dolia* employed as fixed receptacles on merchant ships and thus moved from port to port are not considered, as they likely represented only a small fraction of all *dolia*. Recycling is not included in the diagram, as *dolium* sherds would have been extremely difficult to reduce to small fragments by crushing or grinding, and likely would have been of scant utility for most recycling applications. Bracing in the context of manufacture is assigned a value of 4 to represent the possibility that a significant portion of *dolia* were repaired by the mortice and tenon technique as part of manufacture. Discard at the close of manufacture is assigned a value of 2 to reflect the likelihood that during firing a substantial number of *dolia* developed cracks of a sort that would have rendered them irreparable by the mortice and tenon technique. Distribution is not included in the diagram, as it is assumed that *dolia* were obtained by their prime-use users directly from the workshops where they were produced. The diagram thus has no geographical component. Prime use is provided with an extremely long arrow to correspond with an estimated mean use-life of twenty-five years. Bracing in the context of prime use is assigned a value of 4 to represent the regularity with which *dolia* were repaired by bracing during prime use. Reuse is assigned a value of 2 to reflect the occasional use of *dolia* and *dolium* parts for various reuse applications. Reclamation for reuse is assigned a value

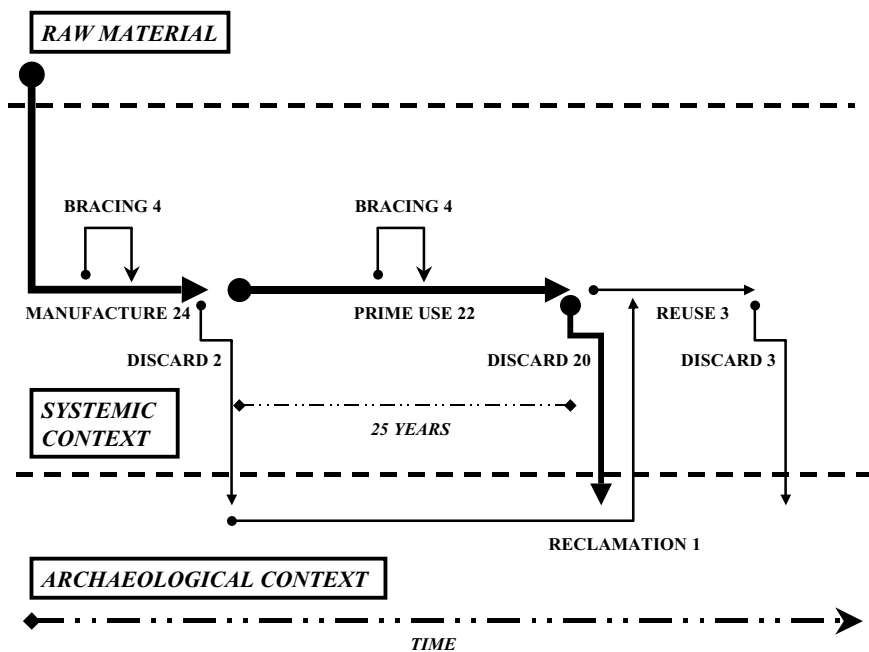
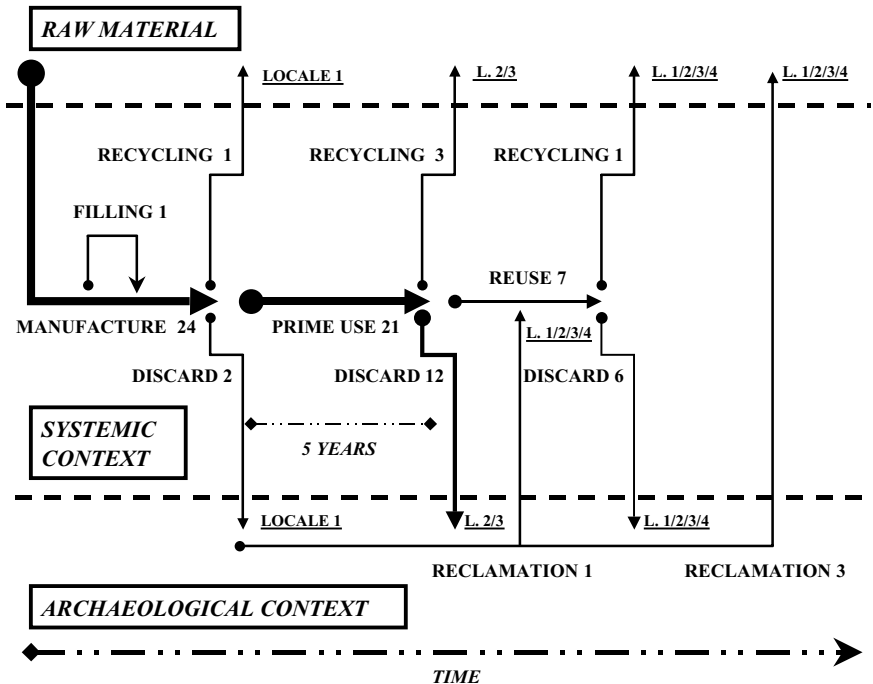


FIGURE 11.1. Flow diagram representing life cycle of *dolia*.

of 1 (yielding a combined value of 3 for reuse) to reflect the likelihood that *dolium* fragments, which as exceptionally large and heavy objects would have been useful for certain reuse applications, were probably on some occasions reclaimed from abandonment deposition and/or archaeological deposits so that they could be employed for one of these.

Amphorae (Figure 11.2): Repair by filling in the context of manufacture is assigned a value of 1 to account for the possibility that *amphorae* were regularly repaired by this technique as part of manufacture. Discard at the close of manufacture is assigned a value of 2 to reflect the likelihood that potters experienced high loss rates in the firing of *amphorae* due to difficulties encountered in achieving uniform firing conditions inside the relatively large kilns in which vessels of this kind generally were fired. Distribution is not included in the diagram, as it is assumed that *amphorae* were filled at the same locale as that where they were manufactured. Prime use is assigned an arrow of intermediate length to correspond with an estimated mean prime-use use-life of five years. Prime use is assumed to entail the transport of a filled vessel from the locale where it was filled to some other locale

FIGURE 11.2. Flow diagram representing life cycle of *amphorae*.

for the consumption of its content, perhaps via one or more intermediate locales. Reuse following directly from prime use is assigned a value of 6 to reflect the fact that used *amphorae* were regularly employed for a wide variety of reuse applications, whereas recycling at the close of prime use is assigned a value of 3 to reflect the likelihood that persons who required substantial amounts of pottery for some recycling application often employed empty *amphorae* and/or *amphora* sherds obtained from wholesale/storage facilities and bulk retail facilities for wine, oil, and/or fish products. Because *amphorae* were reused as packaging for foodstuffs, reuse sometimes entailed their transport to a new locale. Reclamation for reuse is assigned a value of 1 (yielding a combined value of 7 for reuse) to reflect the fact that it may have been expedient to recover *amphorae* and *amphora* parts for various reuse applications from abandonment deposition and/or archaeological deposits. Reclamation for recycling is assigned a value of 3 to reflect the likelihood that persons who required substantial amounts of pottery for some recycling application often employed empty *amphorae* or *amphora* sherds from middens

where wholesale/storage facilities and bulk retail facilities for wine, oil, and/or fish products discarded empty *amphorae*.

Lamps and cookwares distributed beyond their locale of manufacture (Figure 11.3): These two subcategories of vessels had life cycles generally similar to one another, and so are represented in a single flow diagram. Recycling is assigned a value of 1 at the close of manufacture, distribution, prime use, and reuse, and in the context of reclamation to reflect the fact that vessels in these subcategories and parts thereof may have been employed for recycling applications on a regular, if not a particularly intensive, basis. Discard at the close of manufacture is assigned a value of 1 to reflect the fact that there were no particular difficulties associated with the manufacture of these vessels that

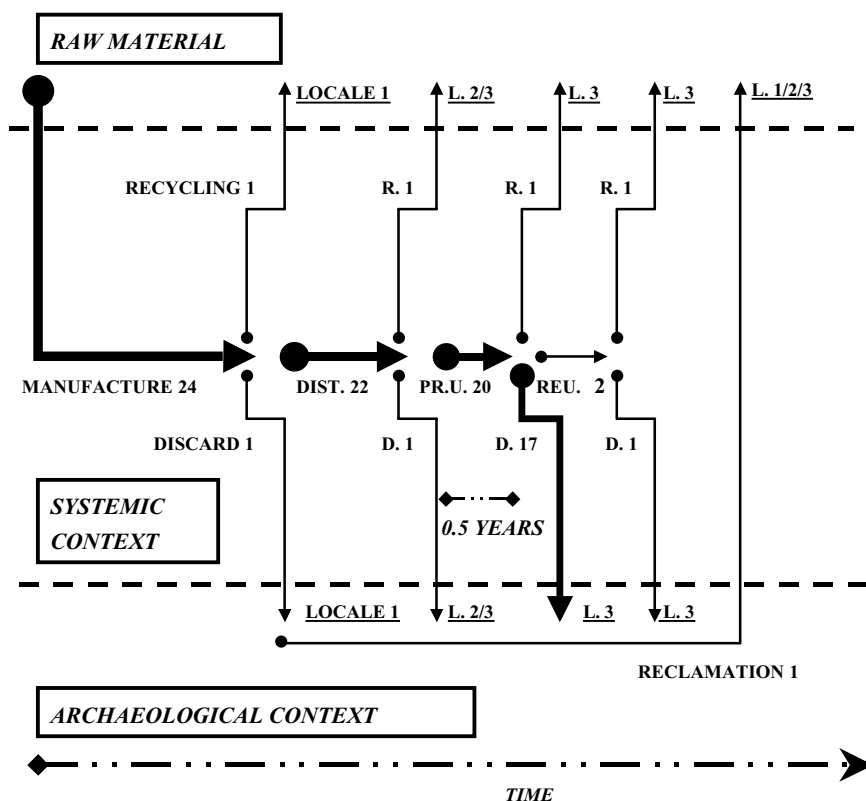


FIGURE 11.3. Flow diagram representing life cycle of lamps and cookwares distributed beyond locale of manufacture.

vessels likely were repaired by this method during manufacture. Second, prime use is assigned an arrow of somewhat greater length to correspond to an estimated mean prime-use use-life of three years.

Tablewares distributed beyond their locale of manufacture (Figure 11.5): The life cycle for this subcategory is similar to that for lamps and cookwares distributed beyond their locale of manufacture, and the flow diagram for it differs from the one for these two subcategories in just four respects. First, discard at the close of manufacture is assigned a value of 2 to reflect the somewhat higher loss rates probably associated with the production of many tablewares due to the difficulties involved in obtaining a surfacing of the correct color and proper uniformity of coverage. Second, discard at the close of distribution is assigned a value of 2 to reflect the greater fragility of many tablewares relative to the other categories. Third, prime use is assigned an arrow of somewhat greater length to correspond to an estimated mean prime-use use-life of three years. Fourth and last, bracing in the context of prime use is included in the diagram, being assigned a value of 1, to reflect

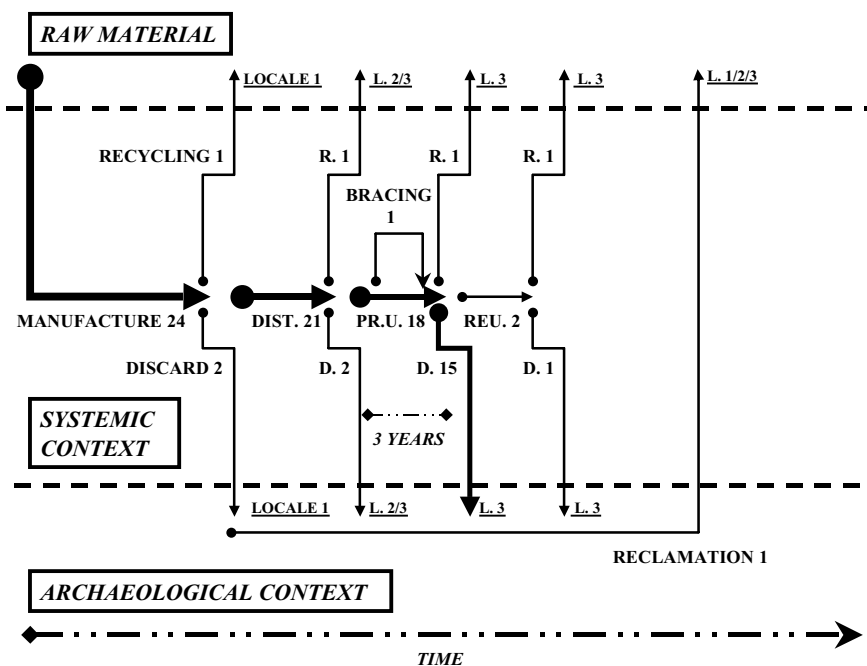


FIGURE 11.5. Flow diagram representing life cycle of tablewares distributed beyond locale of manufacture.

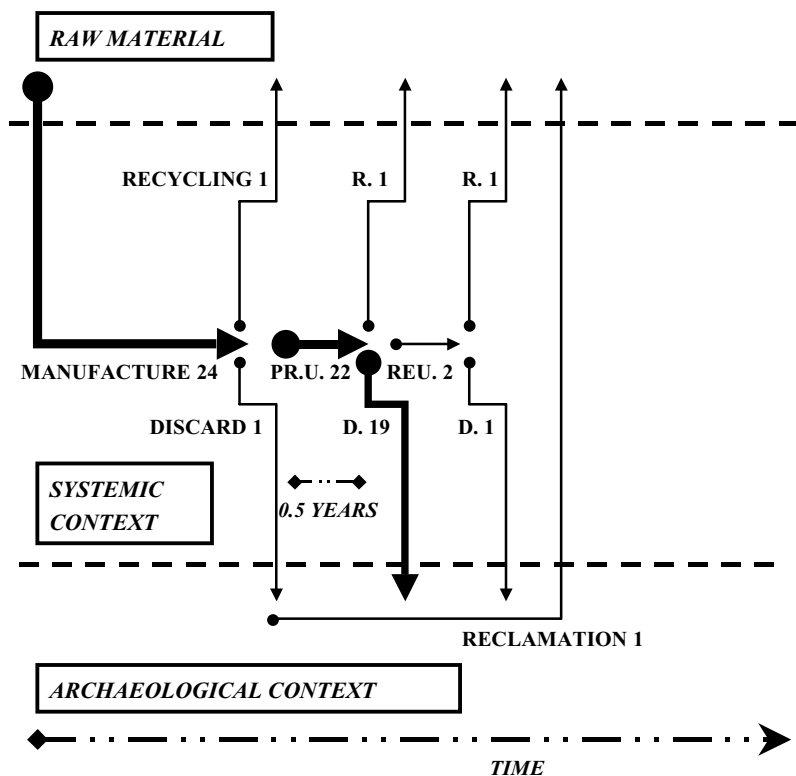


FIGURE 11.6. Flow diagram representing life cycle of lamps and cookwares not distributed beyond locale of manufacture.

the occasional repair of tableware vessels by this technique in the course of prime use.

Lamps and cookwares not distributed beyond their locale of manufacture (Figure 11.6): These two subcategories of vessels had life cycles generally similar to one another and can be represented in a single flow diagram. Their life cycle is similar to that for lamps and cookwares distributed beyond their locale of manufacture, and the flow diagram for it differs from the one for these two subcategories in only two regards. First, distribution and the disposal of pottery damaged in the course of distribution by recycling and discard are not included in the diagram. Second, the diagram has no geographical component.

Utilitarian wares and tablewares not distributed beyond their locale of manufacture (Figure 11.7): These two subcategories of vessels had life cycles generally similar to one another and can be represented in a single flow diagram. Their life cycle is similar to that for lamps and cookwares not distributed beyond their locale of manufacture, and the flow diagram for it differs from the one for these two subcategories only in that the line for prime use is assigned a somewhat greater length to correspond with an estimated mean prime-use use-life of three years.

11.3 / Modeling The Life Cycles of Individual Amphora Classes and Class Groupings

From the discussion of the various reuse and recycling applications attested for *amphorae* in Chapters 5, 6, and 9, it is evident that in many cases individual *amphora* classes and groupings of similar *amphora* classes had their own

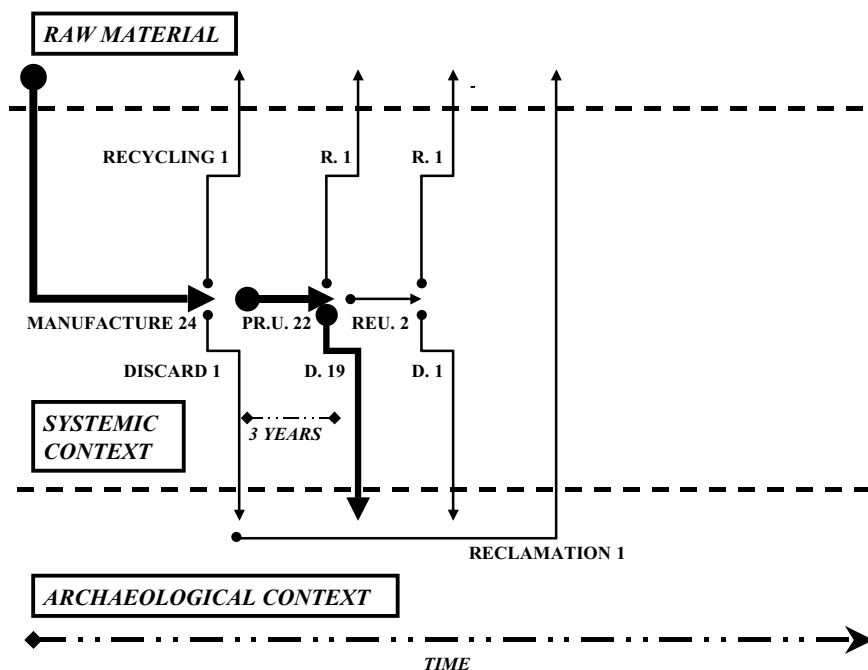


FIGURE 11.7. Flow diagram representing life cycle of utilitarian wares and tablewares not distributed beyond locale of manufacture.

characteristic life cycles that were determined by attributes such as their size, shape, robustness, and suitability for reuse for the packaging or storage of different kinds of foodstuffs and other substances. The formulation of a single flow diagram for the life cycle of all *amphorae*, such as that illustrated in Figure 11.2, thus requires the conflation of data that are divergent in several regards, and necessarily yields a scheme that may well misrepresent the life cycle of any one *amphora* class. To speak of a characteristic life cycle for a specific *amphora* class is also to some extent misleading, because the set of practices that governed the way in which examples of that class passed through the life cycle may well have varied to some significant degree as a function of the period during and the region/locale in which they were emptied of their prime-use content. The relatively intensive reuse of Egyptian Biconical *amphorae* for a wide variety of applications attested at Wadi Umm Hussein represents a good example of variation of this kind. The data currently available are, on the whole, far too fragmentary to permit the formulation of detailed flow diagrams that represent the life cycle for specific *amphora* classes in particular regions during specific time periods. In order to suggest the potential value of schemes of this kind, however, a set of four flow diagrams is here presented. These include a diagram for Dressel 20s emptied of their content at the conclusion of their prime use in the Rome area ca. A.D. 130, a diagram for Dressel 20s emptied of their prime-use content in the lower Rhine Valley region during this same period, a diagram for Dressel 20s emptied of their prime-use content in the Rome area ca. A.D. 225, and a diagram for the various classes of cylindrical *amphorae* manufactured in Tunisia and Tripolitania (African 1, African 2, Tripolitanian 2/3) emptied of their prime-use content in the Rome area during this same period. These diagrams employ the same conventions as those used for the flow diagrams presented in the preceding section. As was the case with these other diagrams, a paucity of detailed evidence regarding the incidence of the various practices taken into account means that the quantitative element of these diagrams is in substantial measure conjectural.

Dressel 20s emptied in the Rome area ca. A.D. 130 (Figure 11.8): Recycling is not included in the diagram, as sherds from Dressel 20s would have been extremely difficult to reduce to small fragments by crushing or grinding, and likely were of scant utility for most recycling applications. Reclamation is omitted on the grounds that newly emptied Dressel 20s would have been available in very considerable numbers in the Rome area, and there thus would have been little need to scavenge examples of this class from

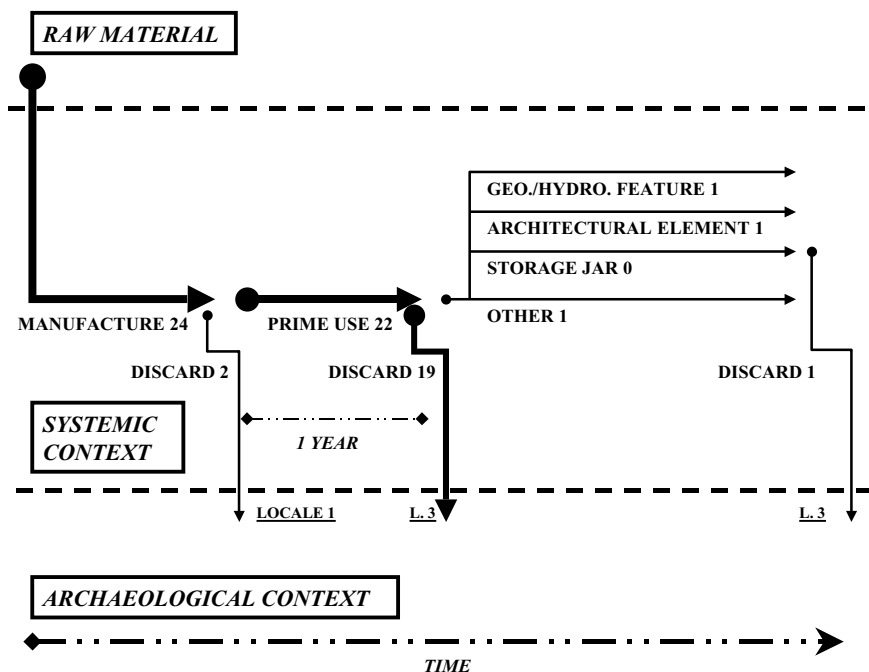


FIGURE 11.8. Flow diagram representing life cycle of Dressel 20 *amphorae* emptied of content at conclusion of prime use in Rome area ca. 130.

abandonment deposition or archaeological contexts for reuse applications. Also omitted is any consideration of locales situated between the locale of manufacture and the Rome area (i.e., Locale 2, in the scheme employed in the flow diagrams) as these do not serve to illustrate any points of significance. Reuse is represented by a set of four distinct reuse applications – each provided with its own arrow – that constitute uses for which significant numbers of examples of this class are likely to have been employed. The four vessels assigned to reuse are distributed over these four applications in a manner that seems plausible in light of the evidence discussed in Chapter 6. Two points are worth noting in this regard. First, one vessel is assigned to reuse as an architectural element, reflecting the utilization of examples of this class as space fillers/lighteners in concrete construction in the Rome area in the A.D. 120s and 130s, and one vessel is assigned to utilization as an element in a geotechnical or hydrogeological feature, reflecting the use of examples of this class for this purpose in the Rome area during

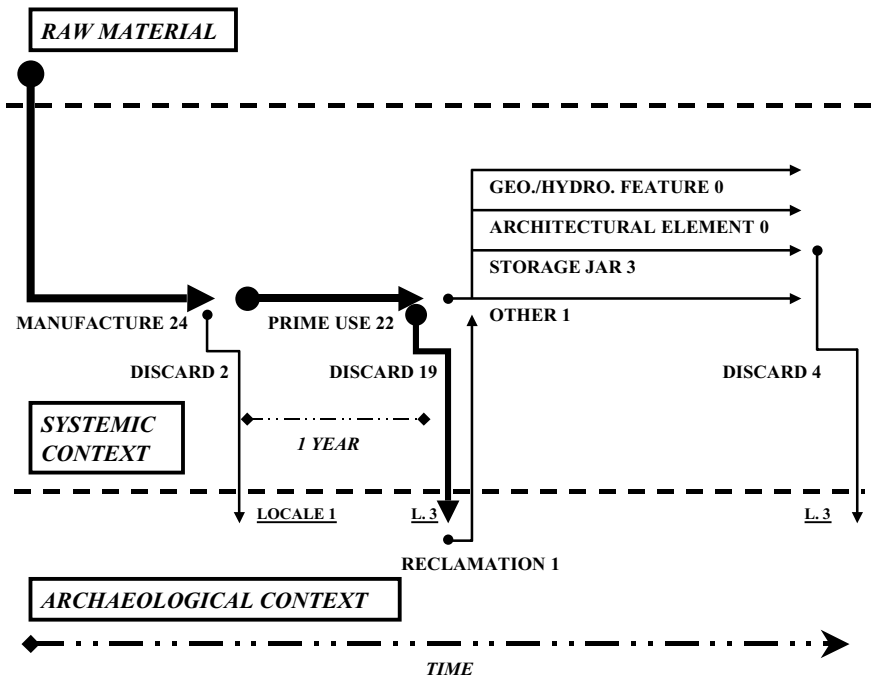


FIGURE 11.9. Flow diagram representing life cycle of Dressel 20 *amphorae* emptied of content at conclusion of prime use in lower Rhine Valley region ca. 130.

the first century. Second, because these two applications represent instances of depositional reuse, the arrows associated with them terminate in the systemic context without linking to the discard arrow associated with reuse. The number of vessels shown passing from the systemic to the archaeological context is thus equal to twenty-two, or two less than the number of vessels manufactured.

Dressel 20s emptied in the lower Rhine Valley region ca. A.D. 130 (Figure 11.9): One vessel is shown being reclaimed for reuse, reflecting the relative rarity of Dressel 20s and *amphorae* more generally in this region. The four vessels assigned to reuse are distributed over the four reuse applications in a fashion substantially different from that embodied in the flow diagram for the Rome area during this period, with three vessels assigned to the storage jar application, reflecting the apparent use of Dressel 20s for the storage of grain in this region. None of these vessels is assigned to a reuse application that is classified as an instance of depositional reuse, and all of the vessels

assigned to reuse are thus shown exiting the systemic context by means of discard.

Dressel 20s emptied in the Rome area ca. A.D. 225 (Figure 11.10): This differs from the flow diagram for Dressel 20s emptied in this region ca. A.D. 130 in just two regards: it shows twenty-one vessels disposed of by means of discard at the conclusion of prime use rather than nineteen, and it assigns zero vessels to the reuse application of architectural element, reflecting the apparent disappearance in the Rome area by this time of the practice of employing *amphorae* as filler/lighteners in concrete construction. As a result, all twenty-four vessels are shown exiting the systemic context by means of discard.

Tunisian/Tripolitanian cylindrical amphorae emptied in the Rome area ca. A.D. 225 (Figure 11.11): A very high cumulative value of eight vessels is assigned to disposal by recycling, reflecting the fact that empty examples of these classes would have been available in large numbers and could have been readily

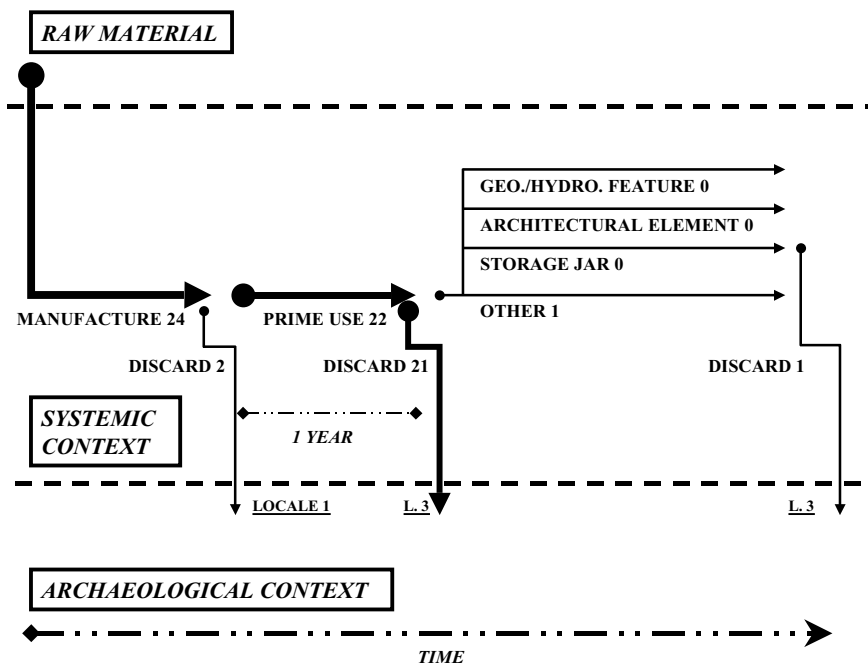


FIGURE 11.10. Flow diagram representing life cycle of Dressel 20 *amphorae* emptied of content at conclusion of prime use in Rome area ca. 225.

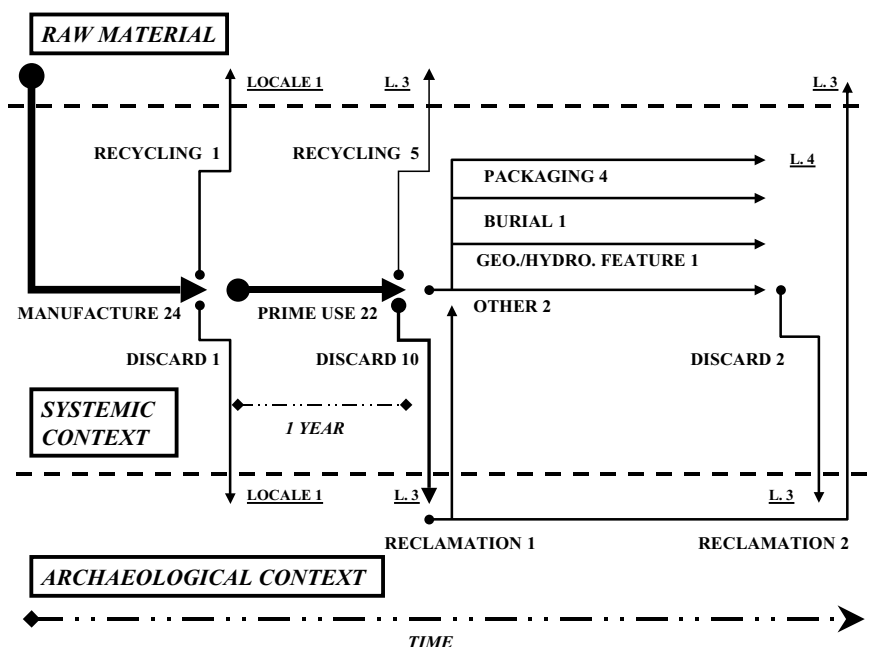


FIGURE 11.11. Flow diagram representing life cycle of cylindrical *amphorae* from Tunisia and Tripolitania emptied of content at conclusion of prime use in Rome area ca. 225.

reduced to sherds for various recycling applications. Two vessels are shown as lost due to production defects, with one of these assigned to disposal by recycling and one assigned to disposal by discard. Of the twenty-two vessels assigned to prime use, five are shown as disposed of by recycling, ten by discard, and seven by reuse. One vessel is shown being recovered from abandonment deposition or an archaeological context for reuse. The very high cumulative value of eight vessels shown for reuse reflects not only the fact that examples of these classes are attested in a wide range of reuse applications in the Rome area during this period, but also the fact that containers belonging to these classes had high efficiency values and were light enough when filled so that a single example could have been handled by a man, or two examples carried on the back of a donkey. Of the eight vessels assigned to reuse, four are shown being reused as packaging, reflecting the certain and possible reuse of containers belonging to these classes for this purpose during this period as evidenced by shipwrecks such as Grado and Cabrera 3; one is assigned to burial, reflecting the use of examples of these classes in the Rome area during this period as sarcophagi and libation

conduits; and one is assigned to utilization as an element in a geotechnical or hydrogeological feature, reflecting the use of examples of these classes for this application at Ostia during this period. Of the eight vessels assigned to reuse, only two are shown exiting the systemic context by means of discard, with two remaining in depositional reuse and four being transported to some other locale as packaging containers.¹

11.4 / *A Typology of Pottery Deposits*

By drawing together the various observations presented in Chapters 3 through 8 regarding the specific ways in which pottery was employed for various prime-use and reuse applications and observations made in Chapter 10 regarding the general categories of behavioral loci where refuse pottery was generated and disposed of by means of discard, it is possible to formulate a general typology of the different types of deposits that constitute the Roman pottery record. A scheme of this kind may prove to be of practical value to students of Roman pottery in that it provides a framework for evaluating the specific activity or range of activities for which any particular pottery deposit is likely to prove informative and, conversely, can serve as a guide for identifying the one or more kinds of deposits a researcher should seek to evaluate in order to elucidate some specific activity or set of activities of interest to him or her. Although determinations of this kind can be (and long have been) made in the absence of such a scheme, the existence of a systematic and comprehensive typology of pottery deposits should encourage and enable researchers to address these questions in a more carefully considered fashion.

Although a typology of this kind might be structured in various different ways, the set of categories recognized in this study suggests the following arrangement:

1. Discard deposits

1.1. Pottery Manufacture

1.1.1. On workshop premises

1.1.1.1. Primary

1.1.1.2. Secondary

1.1.2. Off workshop premises

1.1.2.1. Unmixed

1.1.2.2. Mixed with material of other origin of same type

1.2. Pottery Distribution

1.2.1. Beside/in element of transport system

1.2.1.1. Unmixed

1.2.1.2. Mixed with material of other origin of same type

1.2.2. Wholesale/storage/retail facility for pottery

1.2.2.1. On facility premises

1.2.2.1.1. Primary

1.2.2.1.2. Secondary

1.2.2.2. Off facility premises

1.2.2.2.1. Unmixed

1.2.2.2.2. Mixed with material of other origin of same type

1.3. Pottery prime use/reuse

1.3.1. Distribution of *amphora* contents

1.3.1.1. Beside/in element of transport system

1.3.1.1.1. Unmixed

1.3.1.1.2. Mixed with material of other origin of same type

1.3.1.2. Wholesale/storage/bulk retail facility for wine, oil, and/or fish products

1.3.1.2.1. On facility premises

1.3.1.2.1.1. Primary

1.3.1.2.1.2. Secondary

1.3.1.2.2. Off facility premises

1.3.1.2.2.1. Unmixed

1.3.1.2.2.2. Mixed with material of other origin of same type

1.3.2. Domestic activities and similar

1.3.2.1. On premises

1.3.2.1.1. Primary

1.3.2.1.2. Secondary

1.3.2.2. Off premises

1.3.2.2.1. Unmixed

1.3.2.2.2. Mixed with material of other origin of same type

- 1.4. Mixed deposits (materials of two or more different types of two or more different origins)
2. Depositional use deposits
 - 2.1. Tomb (ossuary/sarcophagus, grave offering)
 - 2.2. Ritual/votive deposit
 - 2.3. Structure (fixture or fill/lightening element)
 - 2.4. Drain, geotechnical or hydrogeological feature (structuring element, conduit, etc.)
 - 2.5. Planter
3. Loss deposits
 - 3.1. Well deposit (when generated by accidental loss of vessels during drawing of water)
 - 3.2. Various forms of sporadic loss
4. Abandonment deposits
 - 4.1. Gradual/planned abandonment
 - 4.1.1. Structure
 - 4.1.2. Activity area without structure
 - 4.2. Sudden/unplanned abandonment
 - 4.2.1. Structure
 - 4.2.2. Activity area without structure
 - 4.2.2.1. Ship/boat
5. Disturbance deposits
 - 5.1. Disturbance and redeposition of single deposit
 - 5.2. Disturbance and redeposition of two or more deposits of same type of same origin
 - 5.3. Disturbance and redeposition of two or more deposits of same type of different origin
 - 5.4. Disturbance and redeposition of two or more deposits of two or more different types of two or more different origins.

As noted in Chapter 1, the definition of the Roman pottery record as “the universe of archaeological deposits containing Roman pottery that were formed during the Roman period” excludes from consideration both Roman pottery redeposited in contexts formed during the post-Roman period and Roman pottery devoid of any known depositional context (i.e., relics, unprovenienced pieces in collections, etc). Pottery of this kind often contains archaeologically useful information, including information

regarding the behavioral practices that governed the formation of the Roman pottery record as here defined, and the scheme presented here might easily be extended to accommodate it.

The assignment of a deposit to a specific type may involve a consideration of one or more of a number of attributes, including the specific or general locus of deposition, the quantitative or qualitative characteristics of the vessels as a group, the condition of individual vessels/sherds, and the nature of any associated artifacts, ecofacts, and matrix. Although in some circumstances it is possible to assign a particular archaeological deposit to one specific deposit type with a high degree of confidence, in many cases it proves difficult to do this, particularly for discard and disturbance deposits, and the best that can be achieved is to assign a deposit to a set of two or more different types. For example, whereas the various dumps of waste pottery from the first phase of the pottery workshop at Iesi described in Section 10.3 are clearly examples of deposit type 1.1.1.2, the dump of unused pottery at La Nautique described in Section 10.4 may be an example of either deposit type 1.2.1 or deposit type 1.2.2.2. The concept of mixed deposits (deposit type 1.4) is not entirely satisfactory, as, in theory at least, it should be possible to distinguish individual types within a larger deposit, assigning each of these to a deposit type consisting of material of the same origin. In practice, however, this is often not possible, or, though perhaps once possible, was not undertaken at the time of excavation, and the best that can be done now is to identify the two or more different origins of the materials that constitute a deposit as it was excavated. Thus, the dump recovered inside a clay extraction pit excavated immediately outside the walls of Tarragona noted in Section 10.2 appears to be a mixed deposit composed of materials corresponding to deposit type 1.1.2, deposit type 1.3.2.2, and perhaps other deposit types. In a similar fashion, it is in some cases possible to specify the one or more different deposit types represented in a disturbance deposit (deposit types 5.1–5.4). Distinctively high levels of homogeneity in form, fabric, dimensions, stamps and *tituli picti*, etc. sometimes permit the recognition as such of unmixed deposits consisting of pottery discarded in the context of manufacture or distribution or *amphorae* discarded following their emptying of their content in the course of its distribution, even when these do not occur in association with a workshop, storage facility, or element of transport infrastructure (i.e., deposit types 1.1.2.1, 1.2.2.2, and 1.3.1.3.1). The same consideration does not apply for deposits of domestic refuse, however, and it is possible to identify unmixed deposits of this kind (i.e., deposit type 1.3.2.2.1) only in cases where these occur

in a limited number of contexts suggesting a low likelihood of the mixing of refuse generated by two or more residential units, such as isolated rural sites and fills from cesspits located on the grounds of an enclosed residential compound. Again, because not all pottery discarded due to a production defect is identifiable as such, as is equally the case with pottery discarded after being damaged in the course of distribution and pottery employed for its prime use application prior to discard, in many cases in which it is possible to establish the presence in a mixed deposit of materials of two or more different origins, it is not possible to establish the origin of some larger or smaller portion of the materials included in that deposit.

11.5 / *The Effects of Different Behavioral Practices on the Pottery Record*

Although the eight behavioral practices discussed in Chapters 3 through 10 would have conditioned the general nature of the Roman pottery record and the composition of specific pottery deposits in several different ways, it seems likely that the effects that these practices produced were not for the most part pronounced enough so that researchers must take some account of them when considering how to collect, analyze, and/or interpret pottery data. These practices did, however, condition the pottery record in five specific ways that are certainly or possibly significant in this sense:

1. Differentials in the use-life of vessels belonging to different forms, classes, and functional categories determined the relative representation of these in discard deposits.
2. Differentials in the incidence of the use of vessels belonging to different forms, classes, and functional categories and of different vessel parts for certain reuse and recycling applications determined the relative representation of these in certain kinds of depositional reuse deposits and perhaps also in some discard deposits.
3. The reuse of *amphorae* as packaging containers caused some *amphorae* to reach consumption sites as packaging for something other than the principal content of the class to which they belong originating in the region in which that class was manufactured.
4. The refuse disposal practices of many residential groups and industrial and commercial establishments meant that the refuse that they generated was deposited in multiple locations, some situated at a considerable distance.

5. The reclamation of pottery from refuse middens for reuse and recycling applications may have led to the substantial disturbance and mixing of these in some cases.

Unfortunately, there is insufficient evidence to permit us to indicate in any degree of specificity the nature of the effects that these practices produced on the pottery record, and the best that can be done at present is to suggest what these are likely to have been in very general terms, as is done to some extent, for example, in the flow diagrams presented in Sections 11.2 and 11.3.

Beginning with the first of the five effects just noted, it is clear that differentials in the length of the mean prime-use use-life of various forms, classes, and functional categories of pottery determined the rates at which these were retired from prime use and, probably in the majority of cases, disposed of by means of discard. The relative proportions of the various kinds of vessels entering the refuse stream and the composition of discard deposits would thus have been in substantial measure conditioned by this factor (Mills 1989; Orton 1993: 178–80; Orton et al. 1993: 166–7; Shott 1996: 464). Unfortunately, as discussed in Section 4.2, there is little direct evidence regarding the length of the prime-use use-life of vessels belonging to these various categories of pottery. The preferential reuse of vessels and vessel parts belonging to certain forms, classes, or functional categories similarly may have conditioned the composition of discard contexts.

Turning to the second of the five effects, the incidence with which vessels belonging to specific classes and/or functional categories or specific vessel parts were employed for certain reuse and recycling applications led to the over-/underrepresentation of these in certain kinds of depositional reuse deposits and also perhaps in some discard deposits.² It is clear, for example, that *amphorae* belonging to certain classes were preferentially selected for use in certain depositional reuse applications (sarcophagus, ossuary, libation tube, filler/lightening element in concrete construction, structuring/fill element in a geotechnical or hydrogeological feature) on account of their size, shape, and/or robustness. It is thus ill-advised to base quantitative evaluations on pottery data derived from applications of these kinds. For example, because a large portion of the *amphorae* considered by Keay in his study of late-imperial *amphorae* in the Western Mediterranean were containers that had been reused as sarcophagi at various necropoleis in Catalonia, his data very likely overrepresent the portion of all *amphorae* used in this region during this period that consisted of large cylindrical containers of Tunisian origin (Keay

1984: 5–69, 606; Remolà 2000: 119).³ The scale of the effects that might be produced by the selective reuse of containers belonging to different classes for applications of this kind is effectively illustrated by the data pertaining to the sets of *amphorae* employed as fill elements in the two contemporaneous hydrogeological features at the Via Beato Pellegrino, Number 55 Site in Padua (Cipriano et al. 1998: 164–8). One of these features, known as Fossa A, was relatively deep and was evidently constructed using containers selected with a preference for tall vessels. The other, known as Fossa B, was considerably shallower and was apparently constructed with a set of containers selected with a preference for short vessels. Thus, whereas no fewer than 128 of the 202 containers employed in Fossa A were examples of the tall Dressel 6B (64%) and only 6 were examples of the much shorter Cretan 3 (3%), the 52 *amphorae* employed in Fossa B included only 8 examples of the Dressel 6B (15%), but no fewer than 19 examples of the Cretan 3 (36.5%). It is unclear which, if either, of these groups of containers should be regarded as representative of the relative proportions of the numbers of examples of these two classes that were emptied of their content at Padua at the time of the construction of these two features during the middle years of the first century.

The extent to which depositional reuse applications of these kinds resulted in the selective removal of a number of examples of certain *amphora* classes from the waste stream sufficient to produce significant effects on the composition of discard contexts is less clear. The fact that on some occasions the construction of individual buildings and geotechnical/hydrogeological features involved the use of hundreds or even thousands of *amphorae*, however, raises the possibility that, at the very least, these practices sometimes may have produced localized effects of this kind.

Too little is known about the kinds of ceramic material employed for recycling applications that required large amounts of crushed or pulverized ceramic (e.g., the use of crushed ceramic as a fill/reagent in impermeable linings, wall/vault surfacings, and concrete pavements, and the use of pulverized ceramic as a filler in mortar and wall plaster) to gauge the impact that these may have had on the representation of pottery classes, functional categories, and vessel parts in discard deposits. As was shown in Section 9.9 in connection with the use of crushed ceramic as a fill/reagent in concrete pavements, however, in some parts of the Roman world during certain periods some of these applications involved the use of appreciable amounts of ceramic material, and, if the persons responsible for carrying out these

operations made a practice of avoiding the use of certain kinds of pottery (e.g., *dolium* fragments, sherds of Dressel 20 *amphora*, *amphora* necks, spikes, and handles in general), while favoring the use of other kinds (e.g., cookware sherds, body sherds of Tunisian *amphorae*), these applications may have had a significant effect on the relative proportions of the various kinds of pottery and/or vessel parts entering the waste stream and/or allowed to remain undisturbed in abandonment and/or archaeological deposition.

Because it seems likely that in many cases the persons who required vessels, vessel parts, or sherds for some reuse or recycling application obtained these directly from establishments for the wholesale/storage/retail of pottery, oil, wine, or fish products or reclaimed these from refuse deposits created by establishments of these kinds, there is a distinct possibility that the composition of discard deposits generated by these establishments has been significantly affected by these practices. As discussed in Section 10.5, for example, it seems likely that practices of this kind significantly affected the relative representation of the different *amphora* classes present at Monte Testaccio. The incidence of these practices presumably varied from establishment to establishment, and because households and other entities that generated what is here characterized as domestic refuse would have obtained pottery from several different establishments, there is a lower likelihood that these practices had a significant effect on the composition of discard deposits consisting of domestic refuse.

On account of these first two effects it is impossible to specify the relationship between death assemblages and the life assemblages from which they derive, rendering it difficult or impossible to relate patterning in the former to many social and economic questions of interest to archaeologists. Thus, in a discard deposit in which there are twice as many *amphorae* of Class A as there are of Class B, with both classes having the same capacity, one cannot conclude that the data represent the consumption of twice as much of the principal content of Class A as of the principal content of Class B, because the relative proportion of the number of containers of these two classes may be significantly determined by the selective removal of examples of one or both from the waste stream for use for one or more reuse or recycling applications. Orton has pointed out that the presence of biases affecting the relationship between life assemblages and death assemblages does not preclude the comparison of two or more death assemblages, provided that these are the same for the assemblages under consideration, with researchers able to document differences from assemblage to assemblage in the relative

proportions of two or more categories of pottery (Orton 1989: 96). Given the apparent complexity of the behavioral practices in question, however, it is difficult to see how it would be possible to demonstrate that the biases that they produced were, in fact, the same for two or more different assemblages. Inasmuch as archaeologists have yet to address the question of what sorts of differences in quantitative pottery data are meaningful from either a statistical or a behavioral point of view (Orton 1993: 177–80; Orton, Tyers and Vince 1993: 173–5), it is difficult at present to develop more specific and useful observations regarding this problem.

Turning to the third of the five effects, although the reuse of *amphorae* as packaging containers often probably involved the use of small numbers of containers belonging to a locally produced class for the packaging of a substance either identical or similar to that class's principal content, in some instances, as the Grado wreck demonstrates, it entailed the use of several hundred containers belonging to two or more classes of nonlocal manufacture for the packaging of a foodstuff or other substance distinctly different from those classes' principal content. Instances of the second kind might not only have removed a large enough number of examples of the classes in question from the waste stream at the locus where they were emptied of their prime content to effect the composition of depositional reuse and/or discard deposits at that locus, but also introduced a substantial number of examples of these same classes into the waste stream at some distant locus, which they reached not as packaging for those classes' principal content, but as packaging for some other substance. This observation raises doubts about the validity of studies – widespread in Roman archaeology over the past three decades – that seek to reconstruct patterns in the distribution and consumption of wine, oil, fish products, and/or fruit by combining evidence for the provenience of the various *amphora* classes with the quantitative analysis of *amphora* assemblages from consumption sites, inasmuch as these are predicated on the assumption that *amphorae* recovered at consumption sites represent the distribution to and consumption at that site of the substance understood to be the principal content of each of the classes represented originating in the region where that class was manufactured.

With regard to the fourth of the five effects, comparative ethnoarchaeological evidence together with a limited amount of direct archaeological and literary evidence suggests that the various entities that generated pottery refuse in the Roman world often, perhaps normally, disposed of this material by discarding it in multiple locations, some of which were situated

at some greater or lesser remove from the premises where it was generated. On account of this practice it is in practical terms impossible to recover the totality of the pottery refuse generated by any such entity, even under ideal conditions, such as might prevail at a well preserved rural site. Thus, at the Villa Regina, despite the excavation down to A.D. 79 ground level of the entire farm compound and the area surrounding it to a distance of between 7 and 22 m, the amount of refuse recovered was so modest that it led the excavator suggest that the inhabitants of the villa discarded a substantial portion of the refuse that they generated in one or more locations beyond the limits of the excavated area (De Caro 1994: 131). In areas of high-density occupation, such as towns, the effects of this practice have rendered it impossible in most cases to associated discard deposits with the specific residences, commercial establishments, etc. that generated them. Although in some cases it is possible to identify discard deposits that appear either certain or likely to have been disposed of on the premises where they were generated (e.g., the deposits of waster pottery dumped into pits of various kinds on the premises of the pottery workshop at Iesi, the pile of sherds recovered immediately inside the south enclosure wall of the vineyard–restaurant that occupied the northwest portion of *Regio 3, Insula 7* at Pompeii), far too little is known about the patterns according to which residential groups, commercial establishments, etc. discarded different kinds of refuse in different kinds of locations to evaluate the degree to which deposits of this kind are apt to be representative of the sum total of refuse that these entities generated. Archaeologists have thus been compelled to study discard deposits from Roman town sites in isolation from the specific behavioral context or contexts that generated the material that they contain, considering them representative of production and/or consumption only at the level of the entire settlement. An important consequence of this circumstance has been the inability of Roman archaeology to address many questions of social and economic interest that would require the characterization of variability in patterns of production and consumption at the level of individual households, workshops, and so forth.⁴ This situation can be compared with that encountered in the field of North American historical archaeology, which has a robust (if often methodologically unsatisfactory) tradition of studies based on the characterization of consumption at the household level, the development of which was inspired and facilitated in no small measure by the practice on the part of both town and rural dwellers in eighteenth- and

nineteenth-century Anglo-America of discarding much of the refuse that they generated in purpose-built trash pits located on the homelot premises.⁵

With regard to the last of the five effects, it seems possible that pottery was reclaimed from refuse middens on a systematic and intensive basis, leading not only to the selective removal of certain kinds of vessels, vessel parts, and wares from deposits of this kind, but also to their substantial disturbance and mixing. Practices of this kind may have been particularly common in Rome and other large cities, as these would have had substantial numbers of economically marginal inhabitants who sought to obtain income by scavenging refuse materials and selling these to individuals and entities who could make use of them. The likelihood that this was a common practice must be taken into account when considering the formation of stratigraphic units identified as refuse deposits and the nature and origin of the groups of materials recovered in these. Specifically, it seems likely that in cases of this kind the boundaries between refuse deposits often may be highly irregular and extremely difficult to define, with the artifactual content of these deposits marked by the presence of larger or smaller amounts of materials introduced from neighboring deposits. At Rome, for example, large deposits made up almost exclusively of refuse dating to the fourth to sixth century frequently contain very small amounts of medieval pottery, and it is often unclear whether these represent late imperial refuse middens contaminated by the introduction of small amounts of material from later deposits by natural processes such as settling, or cultural processes such as reclamation, or deposits formed during the medieval period consisting primarily of residual material of Roman date.⁶

11.6 / *Directions for Further Investigation*

It is possible to identify several lines of investigation that would improve our understanding of the eight behavioral practices that governed the formation of the Roman pottery record and the specific effects that these had on both the general nature of the pottery record and the composition of specific pottery deposits.

With regard to our limited understanding of pottery use-life, it is possible to point to three lines of research that might elucidate some aspects of the problem. First, detailed and comprehensive ethnographic and ethnoarchaeological research aimed at elucidating aspects of vessel use-life in a greater number of cultural contexts and in cultural contexts more closely analogous

to the Roman case from a technological and organizational point of view would likely provide a substantially richer set of more highly relevant comparative data than are currently available that could be employed to formulate a plausible set of minimum, maximum, and mean use-life values for a wide range of vessel forms belonging to several of the functional categories of Roman pottery. Second, investigations aimed at determining the approximate age of large numbers of vessels recovered in precisely dated, use-related contexts would produce useful data regarding general patterns in vessel use life. In practice, research of this kind would probably consist in the main of studies aimed at determining the age of examples of closely dated Italian *Sigillata* forms recovered at the Vesuvian sites. Although this work would be constrained by the fact that in many cases the presence of examples of a particular form at the Vesuvian sites played an important role in efforts to establish that form's chronology, work of this kind might, at the very least, provide useful evidence regarding the extent to which the inhabitants of these sites retained high-end tableware vessels in use for notably long periods of time. Finally, research directed at improving our understanding of the mechanisms that produce the abrasion of slip on vessel surfaces and the deposition of soot on cookwares might lead to the development of techniques that would enable researchers to characterize in a systematic and replicable fashion the degree of slip abrasion or sooting present on certain kinds of vessels. Because the degree of both abrasion and sooting is presumably to some extent a function of the amount of use that a vessel was subjected to, the development of tools of this kind would permit researchers to document gross differences in the length of the use life of sets of comparable vessels at different sites or at a single site during different periods, shedding light on broad patterns of variability in vessel use-life by site, site type (e.g., urban versus rural; high versus low socioeconomic status), region, and/or period.

As noted in the preceding Section, although some recycling applications involved the use of significant amounts of ceramic material, it remains largely unclear whether the material employed for these applications tended to be pottery or architectural ceramic, and, if significant amounts of pottery were utilized, whether certain classes or functional categories were either favored or avoided. It would seem a straightforward if somewhat tedious matter to undertake a systematic survey of concrete pavements, impermeable linings, mortar, and wall plaster for sites or groups of sites with a view to establishing the nature and amount of the ceramic material employed in these.

In the case of applications involving crushed ceramic material, it would be possible using either the naked eye or a hand lens to estimate the amount of ceramic material utilized, establish the presence/absence of pottery and architectural ceramic, and, to some extent, determine the specific classes of pottery employed. The examination of untreated hand specimens under a low-power (ca. 20–40x) binocular microscope would probably allow the more secure identification of the particular classes of pottery present and perhaps also the identification of pulverized ceramic material as either pottery or architectural ceramic. A considerably more costly, time-consuming, and destructive program of microscopy involving the evaluation of polished thick sections or thin sections would allow more detailed characterizations of sand-sized fragments of ceramic material and the more accurate estimation of the amount of ceramic material employed.

Although published descriptions of specific examples of depositional reuse applications that involved the use of large numbers of *amphorae* (e.g., the reuse of *amphorae* as filler/lightening elements in concrete construction, the reuse of *amphorae* as structuring/fill elements in geotechnical and hydrogeological features) provide some idea of the numbers and classes of the containers employed in these, showing that in some cases examples of specific classes were favored on account of their size, shape, or degree of robustness, the systematic study of a large set of examples of one specific application of this kind with a view to documenting the use of *amphorae* in their construction would likely provide a more detailed and accurate picture of geographical and chronological patterns in the preferential use of specific classes. Among other things, this might permit a reliable evaluation of the effects that the construction of examples of that application might have had on the composition of discard deposits.

The fact that the *amphora* component of relatively few shipwrecks has been the subject of detailed characterization renders it difficult to evaluate the degree of regularity with which *amphorae* were reused as packaging containers, and it seems likely that the completion of a large number of additional studies of this kind would serve to demonstrate the overall intensity of this practice and how it varied for specific *amphora* classes, for specific contents, by period, and also perhaps by region. Studies of this kind would presumably involve the documenting of the disposition of the various containers within the ship and the evaluation of some or all of the following vessel attributes: form (including dimensions), forming technique, fabric, capacity, condition (including wear or damage indicative of multiple episodes of use), epigraphy

(including stamps, *graffiti*, and *tituli picti*), stoppering technique, and preserved content.

Research initiatives aimed at the determination of *amphora* content through the identification of organic residues absorbed into vessel walls might also shed considerable light on the reuse of *amphorae* as packaging and/or storage containers. Studies of this kind would presumably be aimed in the first instance at establishing the regularity with which vessels contain absorbed residues indicative of two or more different contents, and, should instances of this kind prove to be common, determining patterns in their occurrence by class, content, context, period, and region.

The exceptional value of the often indifferently recorded and unevenly published evidence from Pompeii regarding the reuse and discard of pottery and refuse discard more generally suggests that the systematic and detailed on-site study of the evidence for these practices at this site would greatly enrich our understanding of these. This might take the form of studies of the generation and management of refuse within specific residences or commercial establishments or studies of the evidence from across the whole of the town for practices such as the collection, storage, and refilling of used *amphorae* at packaging facilities, the reuse of *amphorae* and modified *amphorae* as storage containers, the reuse of *amphorae* and *amphora* parts in architectural and industrial applications, the provisional and definitive discard of pottery and other refuse in streets, gardens, and other agricultural spaces, and the definitive discard of pottery and other refuse in extramural middens.

Deposits of what is likely domestic refuse left in provisional discard in latrines, cesspits, manure pits, and similar features may well represent the only vehicle available to Roman archaeologists for the study of consumption within specific residential units. There has been little effort to explore the nature of these deposits in a rigorous fashion, and it seems likely that studies aimed at the detailed characterization of the pottery and other materials contained in them with a view to determining their potential information value and developing tools for their analysis and interpretation would represent a contribution of considerable value. Studies comparing deposits of this kind with mixed deposits of domestic refuse, which are far more widely available, might serve to define the potential information value of the latter.

The practices of marking pottery with ownership *graffiti* and repairing pottery worn or broken during prime use presumably indicate that the owners of the vessels treated in this way held them to be objects of a certain value. Studies aimed at the systematic documentation of these practices for

single assemblages and sets of assemblages would shed light on differences in the perceived value of pottery by class, functional category, site, site type, region, and/or period.

More generally, pottery specialists would help advance our understanding of the practices that governed the formation of the Roman pottery record if, when characterizing assemblages, they provided careful descriptions of the condition of the pottery, including the presence of wear, surface incrustations, sooting, repair, and/or evidence for physical modification, and the portion and parts of the vessel represented.

Finally, by formulating detailed and comprehensive quantitative models for the flow of pottery through the life cycle and its incorporation into the archaeological record, it would be possible to carry out exercises aimed at simulating the formation of the pottery record, evaluating the possible effects of various behavioral practices, and elucidating the nature of the relationship between life assemblages and death assemblages.⁷

11.7 / *Conclusions*

By combining a general model of the life cycle of Roman pottery with a wide variety of textual, representational, archaeological, and comparative evidence, this study has been able to provide a systematic overview of the nature and operation of the various behavioral practices that governed the formation of the Roman pottery record. The picture that emerges is inevitably somewhat uneven due to the spotty nature of the evidence at our disposal. Despite this shortcoming, the results of this exercise furnish a uniquely detailed and comprehensive view of the ways in which the Romans employed one of the more significant categories of their portable material culture, and in so doing provide useful insights into several general aspects of the use of material culture in the Roman world. Since the various behavioral practices taken into consideration operated in somewhat different ways in different regions and time periods and within different socioeconomic groups, the general model of the formation of the pottery record that is the result of this study cannot be applied by researchers in any direct and detailed fashion to the analysis and interpretation of specific groups of pottery. This study does, however, provide pottery researchers with a general overview of the dynamics of the formation of the Roman pottery record that will allow them to approach the materials with which they work in a more informed fashion. It also identifies several specific factors that students of Roman pottery should take into consideration when undertaking

research, while pointing the way to various lines of investigation that might be pursued with a view to improving our understanding of the nature of the Roman pottery record. It is the author's hope that, with a broad conceptual framework now in place, pottery researchers will employ their knowledge of the evidence from the regions within which and the specific assemblages with which they work to fill in some of the gaps and otherwise improve the general model of the formation of the Roman pottery record presented in this study, to develop detailed models of the formation of the pottery record in specific regions, locales, and time periods that will be of more direct, practical use in pottery research, and to carry out new research aimed at improving our understanding of the various behavioral practices that governed the formation of the Roman pottery record.

Appendix

Amphora Classes Referred to in the Text



*This study makes reference to ca. sixty-five different amphora classes or class groupings, and recalling the basic information regarding each of these no doubt represents a challenge for readers not specialized in *amphora* studies. In the interest of facilitating the use of this book, this Appendix presents two tables that summarize some of this information in convenient form. The first indicates the provenience, date range, and principal content as these are generally understood for each of the classes mentioned in the text. It also provides the page numbers for the entry for each of these classes in D. Peacock and D. Williams' *Amphorae and the Roman Economy* (Peacock and Williams 1986), the most widely used English-language guide to Roman *amphorae* or, in cases where this work does not contain an entry for the class in question, the reference for a description of that class appearing either in another of the general guides to Roman *amphorae* or elsewhere in the literature. Readers should note that the names employed for many of the classes vary among specialists, as do views regarding the date range, principal content, and provenience of certain classes. The second table is a concordance between the various forms in the Schöne–Mau classificatory scheme for *amphorae* from the Vesuvian sites that are mentioned in the text and the more generally accepted names of the classes to which these can be equated.*

TABLE A.1. *Amphora* Classes

Class	Provenience	Date Range	Principal Content	Reference
African 1	Tunisia	l. 2nd–4th	Oil	P&W 153–4
African 2	Tunisia	l. 2nd–4th	Fish products; oil?	P&W 155–7

(continued)

TABLE A.1 (continued)

Class	Provenience	Date Range	Principal Content	Reference
Almagro 50	S. Portugal	l. 3rd–4th	Fish products	P&W 130–31
Almagro 51C	S. Portugal	3rd–5th	Fish products	P&W 132–3
Beltrán 1	S. Spain	l. 1st B.C.–1st A.D.	Fish products	P&W 120–21
Beltrán 2A	S. Spain	m. 1st–2nd	Fish products	P&W 122–3
Beltrán 2B	S. Spain	e. 1st–m. 2nd	Fish products	P&W 124–5
Beltrán 4A	S. Spain	e. 1st–3rd	Fish products	P&W 126–7
Beltrán 72	S. Portugal?	m. 3rd–5th	Fish products	Sciallano and Sibella 1994: 70
Brindisi	S. Adriatic Italy	l. 2nd–m. 1st B.C.	Oil	P&W 82–3
Carrot	Levant	e. 1st–e. 2nd	Dates	P&W 109–10
Cretan 1	Crete	e. 1st–e. 4th	Wine	P&W 177–9; Marangou-Lerat 1995: 67–77
Cretan 2	Crete	e. 1st–l. 2nd	Wine	Marangou-Lerat 1995: 77–82
Cretan 3	Crete	e. 1st–e. 3rd	Wine	Marangou-Lerat 1995: 82–4
Cretan 4	Crete	m. 1st–m. 2nd	Wine	Marangou-Lerat 1995: 84–9
Dressel 1	Tyrrhenian Italy	m. 2nd–l. 1st B.C.	Wine	P&W 86–92
Dressel 2–4	Aegean, Tyrrhenian Italy, NE Spain	l. 1st B.C.–e. 2nd A.D.	Wine	P&W 105–6

<i>Class</i>	<i>Provenience</i>	<i>Date Range</i>	<i>Principal Content</i>	<i>Reference</i>
Dressel 6A	Adriatic/N. Italy	m. 1st B.C.–l. 1st A.D.	Wine	P&W 98–101; Toniolo 1995: 40–45
Dressel 6B	Adriatic/N. Italy	m. 1st B.C.–l. 1st A.D.	Oil	P&W 98–101; Toniolo 1995: 36–9
Dressel 7–11	Spain	1st	Fish products	P&W 117–19
Dressel 20	S. Spain	e. 1st–4th	Oil	P&W 136–40
Dressel 21–22	Lazio/Campania?	1st	Apples, cherries	P&W 96–7
Dressel 23	S. Spain	m. 3rd–4th	Oil	P&W 141
Dressel 25	S. Spain	l. 1st B.C.–m. 1st A.D.	Oil	P&W 134–5
Dressel 26	N. Africa	2nd B.C.–1st A.D.	Oil	Bonifay 2004, 101
Dressel 30	N. Algeria	3rd–4th	?	P&W 171–2
Egloff 172	Egypt	l. 4th–m. 6th	Wine	P&W 206–7
Egyptian Biconical (Nile Silt)	Egypt	3rd B.C.?–5th	Wine	Tomber and Williams 2000 43
Forli	Adriatic Italy	m. 1st–l. 2nd	Wine	P&W 180–81; Toniolo 1995: 54–6
Funnel-mouthed	N. Italy	e. 1st–m. 2nd	?	Toniolo 1995: 57
Gallic 4	S. France	m. 1st–m. 3rd	Wine	P&W 142–3
Grado 1	Adriatic/N. Italy	2nd	Fish products	Auriemma 2000: 34–7

(continued)

TABLE A.1 (*continued*)

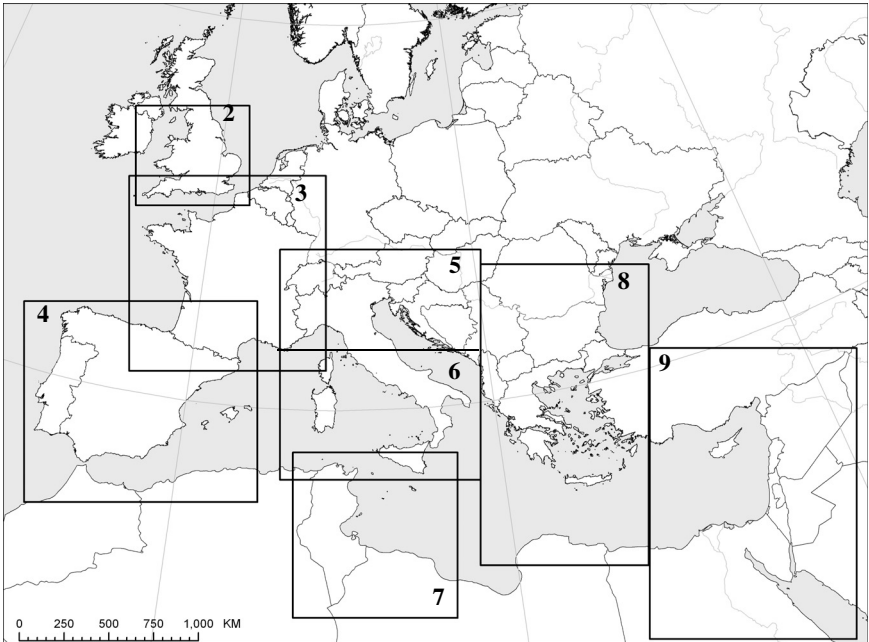
Class	Provenience	Date Range	Principal Content	Reference
Greco-Italic	Tyrrhenian Italy	l. 4th–m. 2nd B.C.	Wine	P&W 84–5
Haltern 70	S. Spain	m. 1st B.C.–m. 1st A.D.	Wine	P&W 115–16
Kapitān 2	Aegean	l. 2nd–4th	Wine	P&W 193–5
Keay 25	Tunisia	l. 3rd–l. 4th	Oil	Keay 1984: 184–212
Keay 26 (Spatheion)	Tunisia	l. 4th–6th	Oil? Fish products?	P&W 202–3
Keay 35A	Tunisia	l. 4th–5th	Oil? Fish products?	Keay 1984: 233–40
Keay 52	S. Calabria	l. 3rd–7th	Wine	Villa 1994: 361–5
Keay 59	Tunisia	l. 5th–l. 6th	Oil? Fish products?	Keay 1984: 300–302
Keay 62	Tunisia	6th–7th	Oil? Fish products?	Keay 1984: 309–50
Knossos 19	Aegean	1st–2nd	Wine	Hayes 1983: 149
Lamboglia 2	Adriatic/N. Italy	l. 2nd–l. 1st B.C.	Wine	P&W 98–101; Toniolo 1995: 24–7
Late Roman 1	Coastal Syria, Cyprus	m. 4th–7th	Wine? Oil?	P&W 185–7
Late Roman 2	Greece/Black Sea	l. 4th–6th	Oil	P&W 182–4
Late Roman 3	W. Anatolia	2nd–7th	Wine	P&W 188–90
Late Roman 4	Gaza	1st–6th	Wine	P&W 198–9
Late Roman 5	C./N. Israel	3rd–6th	Wine	P&W 191–2

<i>Class</i>	<i>Provenience</i>	<i>Date Range</i>	<i>Principal Content</i>	<i>Reference</i>
Late Roman 6	C./N. Israel	4th–6th	Wine	P&W 191–2
Late Roman 7	Egypt	l. 4th–7th	Wine	P&W 204–5
Mau 35	Tripolitania	e. 1st–l. 2nd	Wine	P&W 173–4
Middle Roman 1	E. Sicily	m. 1st–5th	Wine	P&W 175–6
Middle Roman 4	S. coast Anatolia; Cyprus?	2nd–3rd	Wine	Riley 1979: 186–7
Neo-Punic	Tunisia	2nd B.C.–1st A.D.	Oil? Fish products?	P&W 151–2
Pascual 1	Catalonia	l. 1st B.C.–l. 1st A.D.	Wine	P&W 93–5
Pseudo-Koan	Aegean	1st–2nd	Wine	P&W 107–8
Rhodian	Aegean	l. 1st B.C.–e. 2nd A.D.	Wine	P&W 102–4
Richborough 527	Lipari	1st	Alum	P&W 111–12
San Lorenzo 7	Aegean?	3rd–5th	?	Villa 1994: 382–6
Spello	Tiber Valley/ Umbria	m. 1st–l. 2nd	Wine	Panella, 1989: 143–6
Tripolitanian 1	Tripolitania	m. 1st–4th	Oil	P&W 166–8
Tripolitanian 3	Tripolitania	2nd–4th	Oil	P&W 169–70
Type 2020	E. Sicily	1st	Wine	Peña forthcoming
Zemer 53	S. Israel	1st–4th	Wine	P&W 196–7

TABLE A.2. Concordance of Schöne–Mau *Amphora* Forms Mentioned in the Text and *Amphora* Classes

Form	Corresponding Class/Classes
SCHÖNE 1	Small fish products container
2	Not an <i>amphora</i> ?
3	Not an <i>amphora</i>
4	Dressel 21–22
5	Flat-bottomed <i>amphora</i>
6	<i>Urceus</i> , small fish products container
7	Dressel 6A, Dressel 6B, Dressel 7–11, Beltrán 2A, Beltrán 2B
8	Cretan 2
9	Flat-bottomed <i>amphora</i> ?
10	Cretan 1, 2, 3, Early Roman 1
11	Tripolitanian 1, Dressel 26, Type 2020
12	Dressel 2–4
13	Pseudo–Koan
14	Dressel 12
15	Carrot <i>amphora</i>
MAU 16	Not an <i>amphora</i> ?
20	Not an <i>amphora</i> ?
26	Flat-bottomed <i>amphora</i>
29	Dressel 20
35	Small Tripolitanian/Tunisian wine <i>amphora</i>
42	?

Maps*



MAP 1. Areas covered by Maps 2–9.

* The background maps for Maps 1–9 were produced with ESRI ArcGis ver. 8.1, with the geographic data obtained from ESRI, <http://www.cdc.gov/epiifo/africa.htm>, and <http://www.cdc.gov/epiifo/asia.htm>.



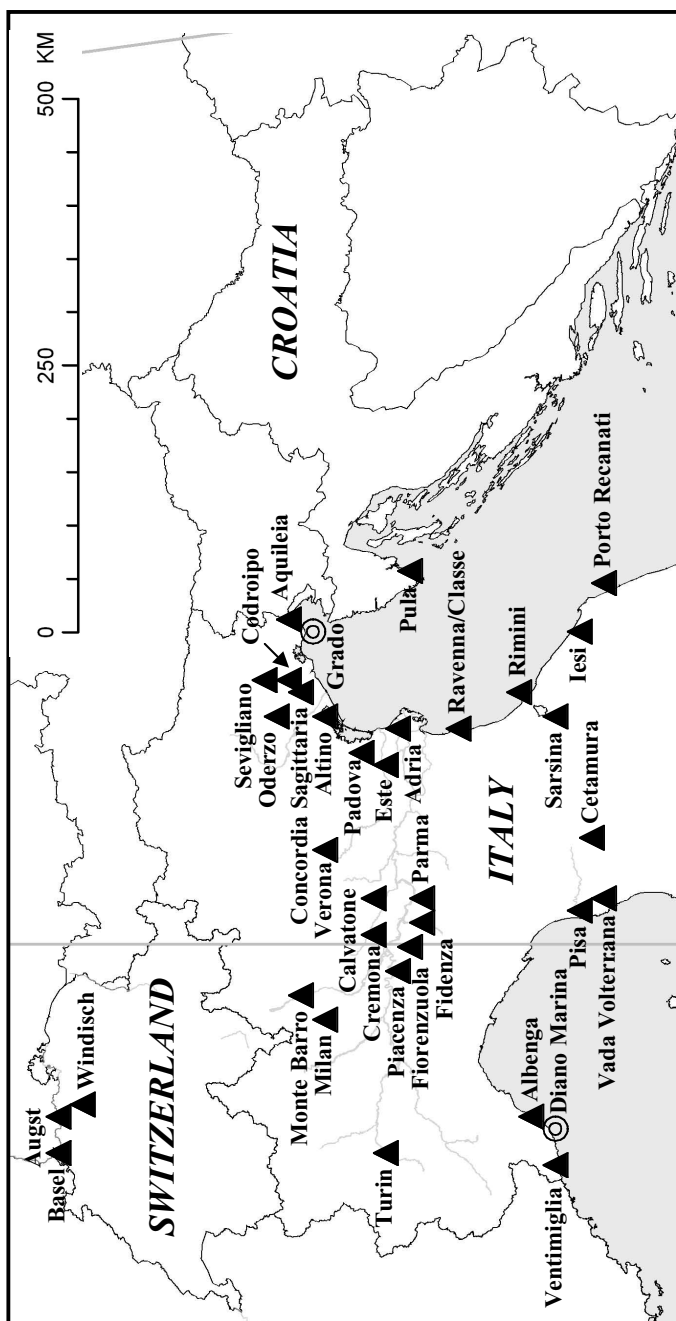
MAP 2. Sites in United Kingdom mentioned in text.



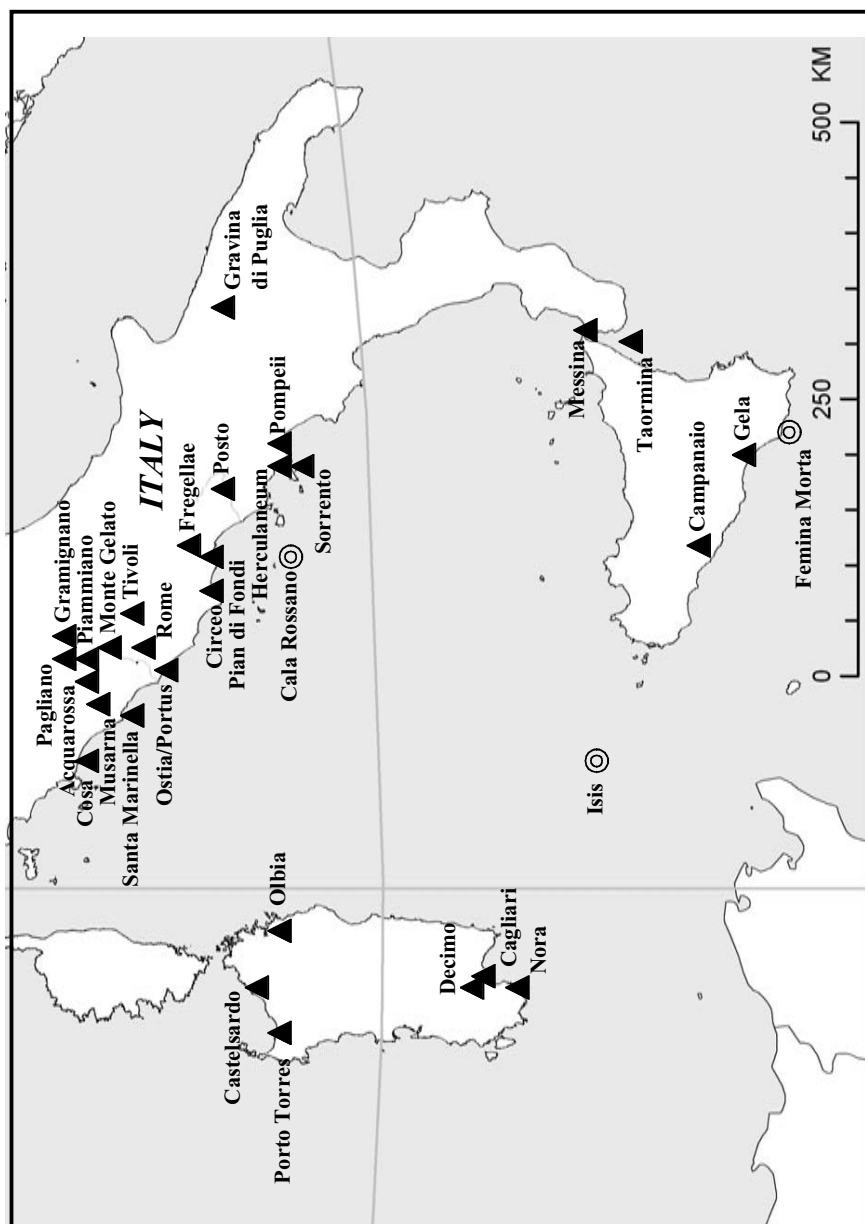
MAP 3. Sites in France, Germany, and the Netherlands mentioned in text.



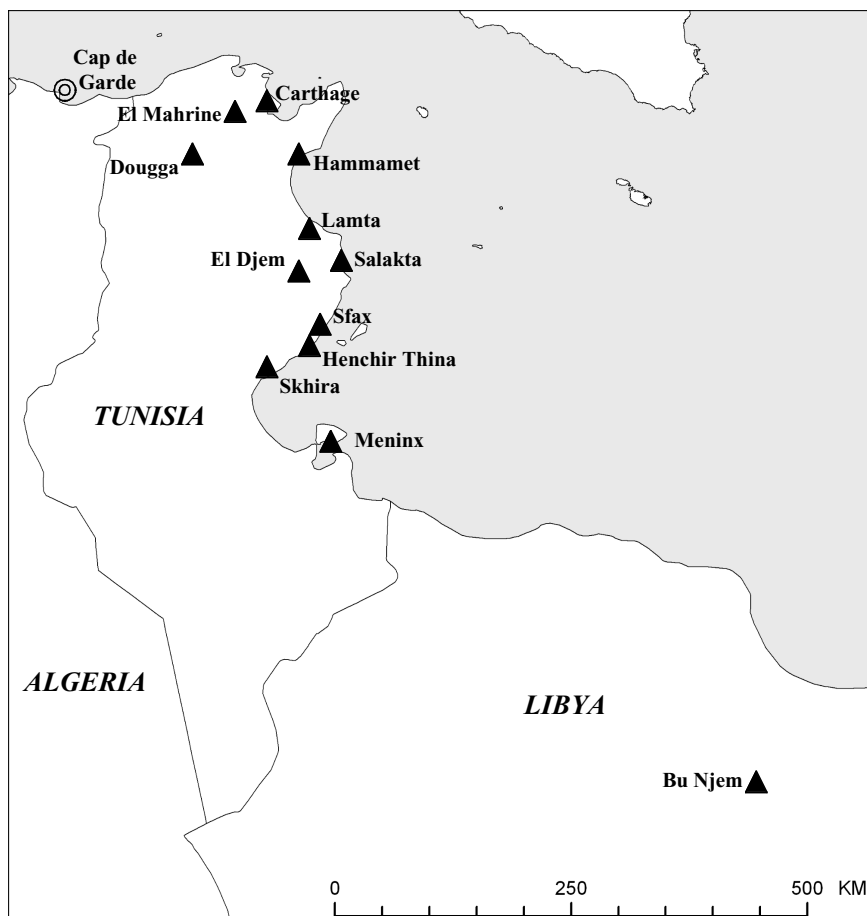
MAP 4. Sites in Spain and western Algeria mentioned in text.



MAP 5. Sites in Switzerland, Croatia, and northern Italy mentioned in text.



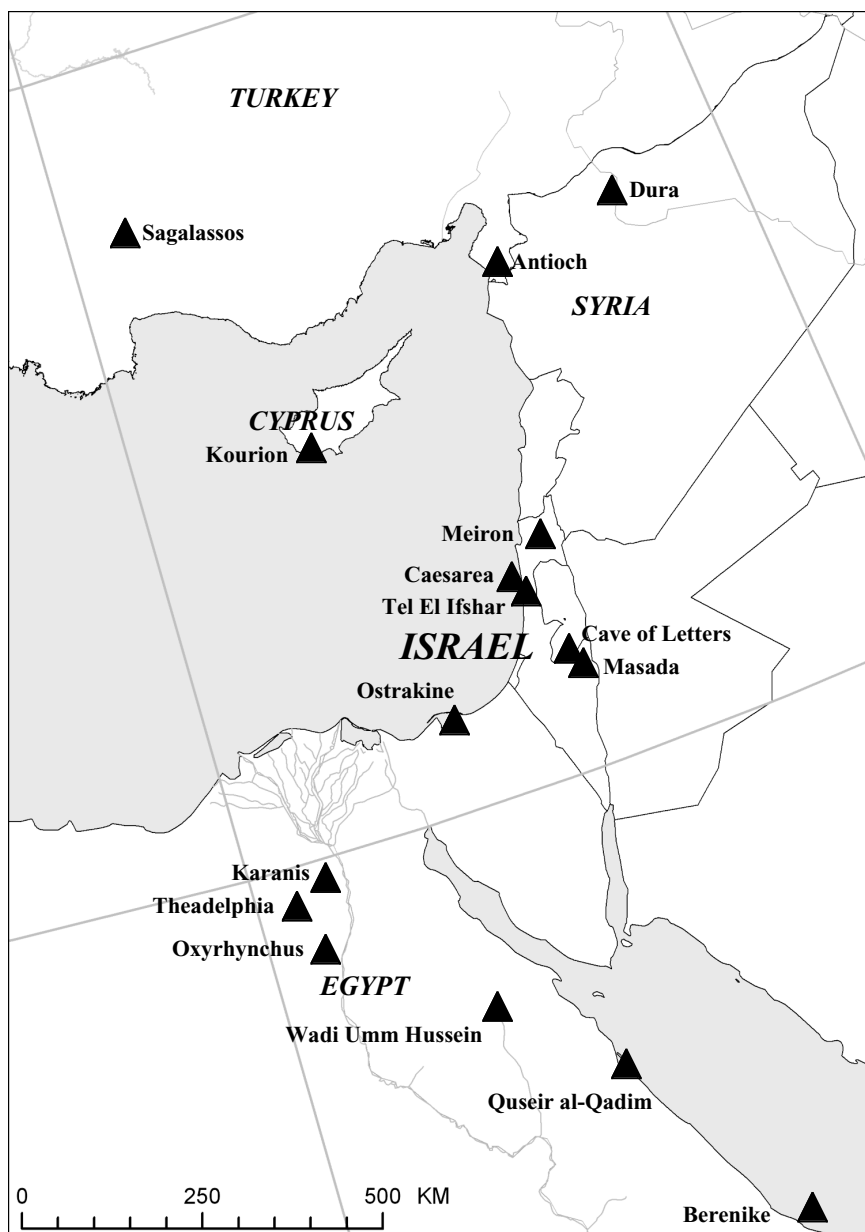
MAP 6. Sites in central/southern Italy, Sardinia, Sicily, and western Mediterranean mentioned in text.



MAP 7. Sites in eastern Algeria, Tunisia, and western Libya mentioned in text.



MAP 8. Sites in Romania, western Turkey, Greece, and eastern Libya mentioned in text.



MAP 9. Sites in southern Turkey, Cyprus, Syria, Israel, and Egypt mentioned in text.

Notes



Chapter 1: A Model of the Life Cycle of Roman Pottery

1. See Renfrew 2004: 2930 for this question.
2. Schiffer 1996: 8990 labels artifacts abandoned in the context of more general abandonments of this kind de facto refuse.
3. See Holtorf 2002 for a consideration of aspects of the reentry of artifacts into the cultural context in this way.
4. Worth noting in this connection is the fact that reclamation is a concept introduced into the literature by Schiffer as early as 1987. See Schiffer 1996: 10611.

Chapter 2: Background Considerations

1. For the purposes of this study the various sorts of texts normally produced on intact pots (as opposed to potsherds) are not classified as documentary evidence.
2. The editors of the *Digesta* not only excised portions of the original texts included in this work, but also inserted words, phrases, and longer passages in order to clarify or modify the meaning of these, and the specific content of an entry thus may reflect the views of the sixth-century compilers of this work as much as or more than those of the jurist to whom the passage is credited. For a concise overview of the problems raised by interpolations of this kind and the ways in which scholars have approached these see Robinson 1997: 10513.
3. Brand 1953 presents a comprehensive study in modern Hebrew of references to pottery in the rabbinic literature. As the author does not read Hebrew, he was unable to employ this book for the present study. For discussions in English of some of the passages in the rabbinic literature relevant to pottery see Zevulun and Olenik 1979; Vitto 1987.
4. Hilgers 1969 presents a comprehensive catalog of passages in Latin literature referring to containers of various kinds, including pottery.
5. For studies concerned with the reuse and recycling of pottery in various other archaeological and ethnographic cases see Lister and Lister 1981; van Doorninck 1989; Sullivan 1989; Deal and Hagstrom 1995; Scott 1997; Lawall 2000; Bourriau et al. 2000: 143. For general discussions of these practices see Heron and Evershed 1993: 2589; Rice 1987: 3034. For tables listing instances of the reuse and recycling of pottery among various cultures see Rice 1987: 294; Deal and Hagstrom 1995: 123.
6. For general overviews of this functional category see White 1975: 1447; Annecchino 1982: 7568. For the Latin literary sources pertaining to *dolia* see Hilgers 1969: 1716. Latin speakers regularly referred to smallsize *dolia* as *metretae* (singular: *metreta*), *orcae* (singular: *orca*), or *seriae* (singular: *seria*). For these forms see Hilgers 1969: 221, 2356, 2767; White 1975: 1667, 18083, 1858. Greek speakers generally employed the term *πίθοι* [*pthoi*] (singular: *πίθος* [*pthos*]) to refer to *dolia*.
7. For a general overview of this functional category see Peacock and Williams 1986. For the Latin literary sources pertaining to *amphorae* see Hilgers 1969: 99102. Latin speakers regularly used several other words to refer to these containers, including *cadus* (plural: *cadī*), generally in reference to vessels at the large end of the size range, and *lagoena* (plural: *lagoenae*), generally in reference to containers at the small end of the size range. For these forms see Hilgers 1969: 1256, 2035; White 1975: 12730, 1614. Note also that the word *amphora* referred to a standard unit of liquid measure equal to one cubic foot, or 26.2 l. This unit, also known as the *quadrantal*, was divided into 48 *sextarii* of 0.547 l. Greek speakers generally employed the term *κέρμια* [*kermia*] (plural: *κέρμια* [*kermia*]) to refer to *amphorae*. In Late Hebrew/Aramaic texts, the term *קנקן* [*kankan*] (plural: *קנקנים* [*kankanim*]) is generally employed to refer to *amphorae*, with *חבית* [*chabit*] (plural: *חביות* [*chabiyot*]) reserved for examples of the Palestinian bagshaped *amphora*. Late Roman 56 *amphora*. See Zevulun and Olenik 1979: 269.

8. The designation of glossslipped tablewares as finewares is somewhat misleading, as these classes do not in every case (e.g., African *Sigillata* A and D) possess a fabric that has a fine texture, whereas certain other classes not generally recognized as highend tablewares do possess a fabric with a notably fine texture.
9. The pricing evidence for pottery in the Roman world is assembled and analyzed in Rubin 1999.
10. For the text of the *Edictum de pretiis* and a discussion of the circumstances of its issuing see Giacchero 1974. The extent to which the imperial administration succeeded in enforcing the pricing scheme embodied in this document is unclear, although it seems highly unlikely that it could have achieved its stated purpose of containing the high level of inflation apparently affecting retail prices at the time of its issue. Important for purposes of the present study, however, is the fact that this scheme was the fruit of an effort on the part of the imperial administration to construct a reasonable, internally coherent set of maximum prices for a wide range of everyday goods and services.
11. Evans 2004: 121 provides data for the incidence of sherds bearing *graffiti* relative to sherds in general for several excavated sites in England as follows: Catsgore: 1:12,500; Chepstow: 1:10,585; Catterick (rural town edge site): 1:5,028; Catterick (CEU Site 45): 1:1,4001,500; Catterick (CEU Site 46): 1:1,676; Alcester, Gas House Lane: 1:1,825.
12. See, for example, the following: *CIL* 15.5295, a *graffito* inscribed under the foot of a vessel found at Rome characterized by the editor as a *vas arretinum* (hence, presumably, a *sigillata* vessel of some kind): *NOLI ME TOLLERE HELVEITI SVM* [Wish not to carry me off I belong to Helvetius]; *CIL* 4.6251, a *graffito* inscribed on the belly of a jar from Pompeii: *EPAPHRODITI SVM TANGERE ME NOLI* [I belong to Epaphroditus Wish not to touch me]; *RIB* 2501.307, a *graffito* inscribed on the exterior of the wall of a Gallic *Sigillata* Dragendorff 31 bowl dated ca. /8a.d. 180260 from a cemetery at Ospringe, in England: *LVCIVS (I)VL(VS) DIANTVS VICTOR VICTORICVS VICTORINA VASS COMMVNIS* [Lucius, Iulius, Diantus, Victor, Victoricus, Victorina. [Their] common vessel].
13. Interesting in this regard is *CIL* 4.64, a *dipinto* of Republican date found at Pompeii on a building faade along the Via dei Teatri at *Regio* 8, *Insula*. 4, doorways 334. According to the restoration of this text presented in Wallace 2005: 31, it reads *VRNA AENIA PEREIT DE TABERNASEIQVIS RETTVLERIT DABVNTVRHS LXV. SEI FVREM DABIT VNDE [REM]SERVARE PO[SSIMVS HS/XX CIIII]*. [A bronze pot has been lost from this shop. If someone returns it 65 *sestertii* will be given (in reward). If the person shall hand over the thief, whereby we shall be able to recover the object, 84 *sestertii* will be given (in reward).] It is difficult to imagine the owner of a ceramic vessel that had gone missing posting a notice of this kind.
14. See, for example, Ammianus Marcellinus *Res gestae a fine Corneli Taciti* 22.4.6, which, in condemning soldiers who had become overly accustomed to a soft and luxurious lifestyle, states *graviora gladiis pocula (testa enim bibere iam pudebat)* . . . [their cups weighed more than their swords for he (i.e., the Roman soldier) had by now become ashamed to drink from a ceramic vessel . . .]

Chapter 3: Manufacture and Distribution

1. Interesting in this regard is *Mishnah* Tohoroth Kelim 2.6, which considers whether a damaged vessel found in a potters kiln can be considered clean according to Jewish law.
2. Fragments of vessels that cracked or were otherwise ruined during the forming, drying, or slipping phase of manufacture and never subjected to firing are also sometimes recovered at Roman pottery workshop sites. These are not here considered pottery, however, because never having been fired, the ceramic paste from which they were formed was not transformed into a ceramic body.
3. For comments by a working potter regarding the highly imperfect relationship between wasters and overall workshop production see Bosworth 1982: 478. For firing loss rates documented in various ethnographic studies see Rice 1987: 1734.
4. For general observations regarding the information value of pottery assemblages from pottery workshop sites see Lewis 1983. For a set of general recommendations regarding procedures to be employed for the investigation of Roman pottery workshop sites see Swan 1984: 12731.
5. See *Geoponica* 6.3, where it is asserted that large *pthoi* are not manufactured on the wheel, but rather on the ground.
6. See Nicholson and Patterson 1989: 80, 82 fig. 8, which reports a loss rate of 4.78% for the firing of a load of 627 Balls jars, water jars generally similar to *amphorae* manufactured in Egypt by contemporary

pottery employing traditional methods. The 627 jars were stacked in five layers inside an updraft kiln ca. 4.5 m in diameter. Twentyone of the thirty jars lost in firing were from the lowest of the five layers, another five from the next lowest layer, and but four from the upper three layers.

7. See Rhodes 1989 for a review of the groups of pottery lost or discarded between the workshop and the consumer from Italy and the northwest provinces of the empire.

Chapter 4: Prime Use

1. For the use of pottery in agricultural compounds see White 1975: 105204; Annecchino 1982.
2. For the various factors that determine vessel uselife see Orton et al. 1993: 207; Shott 1996: 4645.
3. Cato *De agri cultura* 81 describes a vessel termed an *irnea*, employed for the baking of a special type of cake, that was broken open to extract the cake for serving. Columella *De re rustica* 12.15.45 describes the breaking of *testae* (pots) in order to remove hardened fig paste that was stored inside them.
4. For the breaking of ceramic vessels by animals, including cattle and fowl, see *Mishnah* Nezikin Babba Kamma 2.1, 2.3, 5.2.
5. For evidence from a userelated context of seventhcentury date at Ostia for the retention of tablewares and *amphorae* in use for exceptionally long periods of time, perhaps due to the disruption of supply, see Martin et al. 2002: 2859.
6. For the ongoing use of broken vessels and vessel parts see also *Mishnah* Tohoroth Kelim 3.16, 4.13. Perhaps also relevant is Festus *De verborum significatione* 168.2123.
7. The Galilean *pach* may correspond to one of the closed forms manufactured at the important pottery production center of Kefar Hananya, in the Galilee. For these forms see AdanBayewitz 1993: 13547.
8. Ethnographic research has demonstrated a strong positive correlation between vessel size and uselife that can be attributed to the robustness of large, heavy vessels, their high replacement costs, and the infrequency with which they are moved. See Shott 1996.
9. See also the similar opinion expressed by the secondcentury /8a.d. jurist Pomponius in *Digesta* 33.6.14.
10. Wine *amphorae* very occasionally bear two dated *tituli picti*, one indicating the date that the wine was *natum* [born, i.e., produced], the other the date that it was *diffusum* [bottled]. The two dates differ by as little as one and as much as seven years. See, for example, *CIL* 15.4539 (1813 /8b.C.), 4571 (2 /8b.C./8a.d. 3), 4573 (/8a.d. 2936), 4588 (54 /8b.C.).
11. This includes all dated *tituli picti* on *amphorae* published in *CIL* 4, excluding those found at Stabiae and Herculaneum, those of uncertain date, and those said to be either on a fragment of an *amphora* or on an *amphora* neck. For a somewhat different treatment of this evidence see Laurence 1994: 57.
12. For structured landfills see Section 6.27.
13. Crucial to Zevis dating of the deposit is the assumption that the presence of a stamp of G. Antonius Quietus on a Dressel 20 recovered in it indicates a date in the second half of the first century. With this assumption it is possible to assume that *CIL* 15.4612 bears a consular date of /8a.d. 45 rather than /8a.d. 31.
14. These figures omit one of the two containers dated to /8a.d. 36 on the ground that this constitutes the benchmark employed to calculate the age of the other containers.
15. For retaining walls constructed of *amphorae* see Section 6.27.1. Freed and Moore 1996: 21 states that fourteen *amphorae* bearing *tituli picti* were recovered from this structure.
16. Freed and Moore 1996: 21 state that among these containers were both a Dressel 4 and a Dressel 6A bearing a consular date of 17 /8b.C. DeLattre 1894: 97, in contrast, documents only one container bearing a consular date of 17 /8b.C. This suggests that Freed and Moore were able to identify a container dated to this year that was not documented by DeLattre, thus accounting for the discrepancy between the numbers of dated containers in the two works indicated in the preceding note.
17. These figures omit the latest dated container on the ground that it represents the benchmark by which the ages of the other containers were calculated.
18. See *Digesta* 18.6.1 pr. for the breakage of unidentified wine containers (presumably *amphorae*) while being held in storage. See *Mishnah* Nezikin Babba Metzia 3.9 and 3.12 for the breakage of a vessel termed a *chabit* while being held in storage.
19. See *Mishnah* Nezikin Babba Kamma 10.4 for the emptying of a *chabit* containing wine in order to save the honey being held in a jug that had cracked.

20. Differences of this kind between cooking wares were probably well understood in the Roman world. *Talmud Babli* Shabbat 120b, for example, notes the superior resistance to heat of vessels manufactured at the important cookware production centers of Kefar Shinin and Kefar Hananya. For experimental data highlighting the comparative thermal performance of West Central Italian Cookware and African Cookware see Schuring 1986: 18599.
21. See Pea 1999: 12237 for various patterns and degrees of sooting on cookwares from a late third–fourth-century deposit from the Palatine East excavations. For the analysis of the incidence of sooting on different vessel forms in assemblages from various Roman-period sites in the north of England see Evans 1993: 105. For the processes involved in the sooting of cookware see Skibo 1992: 14573.
22. This lack of interest on the part of Roman pottery specialists may be contrasted with that attested in North American historical archaeology, where there is a long and well-developed tradition of research directed at the description and interpretation of use marks on glazed tablewares. For a useful, if somewhat dated, overview of this work see Griffiths 1972.
23. The pieces in question are Accession Number 4974, a fragment of a Hayes 65 dish recovered in Context B206; Accession Number 6568, a fragment of a Hayes 59, 65, or 67 dish recovered in Context B228; and Accession Number 6569, a fragment of a Hayes 59, 65, or 67 dish recovered in Context B206. The latter two fragments may belong to the same vessel.
24. Alternatively, one can posit the introduction at this time of some new method for the consumption of the food served in these vessels that produced the kind of surface damage that they display.

Chapter 5: The Reuse of Amphorae as Packaging Containers

1. There is a modest amount of evidence for the reuse of *amphorae* as packaging containers in the Greek world. For general comments see Whitbread 1995: 234. See Lawall 2000 for the argument that *graffiti* on *amphorae* from Athens show that in the later fifth century /8b.c. these were reused for the packaging of wine and perhaps also honey and meat. For *PSI* 424, a document probably dating to the mid-fourth century /8b.C. that attests to the reuse of Knidian and Chian wine *amphorae* for the packaging and distribution by ship of Egyptian wine and olives, see Rathbone 1983: 83.
2. See Pea 1999: 756 for the *amphora* classes that likely served for the packaging of *Tauromenitanum* and *Mamertinum*.
3. It cannot be excluded that *amphorae* were on some occasions, perhaps even regularly, provided with a label of some kind other than a *titulus pictus* that served to identify their content. The Cap de Garde wreck, the remains of a merchantman that went down off the coast of Algeria during the period ca. /8a.d. 285–365, for example, yielded a group of eight African 2Ds that had a lead tag wrapped around one of their handles identifying the *officina* [workshop] at which their content, presumably fish products of some sort, had originated. See Lequent 1975; Parker 1992a: 102 no. 185. For wooden labels and labels fabricated from sherds that might have been attached to *amphorae* with string, see Section 6.21.
4. See Frier 1983: 28995 for the argument that the wine trade was generally characterized by an environment of mature mercantilism, in which the various participants recognized that it was advantageous to observe practices of fair dealing.
5. In contrast, *tituli picti* on some Dressel 20s indicate that these containers were filled *ad summum labrum* [to the top of the lip], raising the possibility that examples of this class and perhaps classes of oil *amphorae* were normally filled to as high a point as was practicable in light of the method to be employed for their stoppering. See Rodríguez Almeida 1989: 30.
6. One of these containers retained a broken drill bit still lodged in the hole at the time of its recovery.
7. Della Corte 1958: 162 states that the two containers from the *caupona* in *Regio* 2, *Insula* 7 were *ridotte a fornacelle* [cut down to serve as braziers?], as were the three from the *caupona* in *Regio* 2, *Insula* 4, but does not indicate the basis for this interpretation.
8. Although the excavators assume that this *amphora* class was produced exclusively in Byzacena, that is, central-southern Tunisia, some examples were manufactured in fabrics that point to an origin in north Tunisia. See Pea 1999: 92.
9. For efforts to infer the mechanisms employed for the distribution of Gallic *Sigillata* tablewares on the basis of analyses of the richness and evenness of the distribution of makers marks among groups

- of vessels recovered from shipwreck, warehouse, and retail outlet sites see Rhodes 1989: 468; Millet 1993: 417–19.
10. For a discussion of cargo bulking practices that might produce heterogeneity among a merchant ships consignment of *amphorae* see van Alfen 1996: 212.
 11. For return cargos from OstiaPortus see Pea 1999: 8. For the use of brick and tile as ballast for ships sailing from OstiaPortus to Carthage see Tomber 1987.
 12. For moldmade terracotta figurines from Ostia of first or secondcentury date representing a stevedore carrying a loaded sack on his back see Pavolini 1986: 111 fig. 43; Descœudres 2001: 408 nos. 34.
 13. The discussion of this facility that follows assumes that north lies to the rear of the premises, as indicated in Figure 6.2.
 14. Auriemma 2000: 45 states that most of the containers in this group were Dressel 2122s. She further asserts that a group of containers consisting mostly of Dressel 24s were found in the northwest corner of the garden, and that a third group, consisting of large cylindrical containers, perhaps Tripolitanian 1s, and cigarshaped containers, perhaps examples of the NeoPunic *amphora*, were found in the gardens southwest corner. Auriemma nowhere indicates the source of her information, and it may be that these affirmations are based in some way on the description and photographs of this facility published by Curtis.
 15. Pliny *Naturalis historia* 31.43.94 states *laudantur et Clazomenae garo Pompeique et Leptis* [Clazomenae, as well as Pompeii and Lepti are praised for their *garum*]. From this it seems fair to infer that that Pompeian *garum* was probably distributed in at least modest amounts to extralocal markets.
 16. The discussion of this facility that follows assumes that north lies to the rear of the premises, as indicated in Figure 5.5.
 17. The identification of these containers as Cretan 2s is also supported by the fact that all seven of the containers documented as having been recovered in the northwest corner of the *atrium* of this facility in *CIL* were assigned to Schne 2, a category which corresponds for the most part to the Cretan 2 *amphora*. See below. Timby 2004: 386, however, states that the recent excavations in this house recovered the remains of thirtyeight Cretan 1s, two Cretan 2s, five Dressel 24s of Italian origin, and three containers similar to the Brindisi *amphora*.
 18. Timby 2004: 388 estimates that the Cretan *amphorae* recovered in /8a.d. 79 levels at the Casa di Q. Mestrius MaximusLupianar di Amarantus complex would have held at least 2,150 l of wine.
 19. The container on which *CIL* 4.10438 was written, also identified as a Schne 8, is said to have been recovered in the *atrium* of this structure. Whether it also belongs to the group of containers found in the northwest corner of the room is unclear.
 20. The Schne 12 should normally correspond to the Dressel 24 and the Schne 13 to the PseudoKoan *amphora*.
 21. The *CIL* identifications provided here for the *amphorae* found in the garden and corridorportico are slightly at variance with those given in Berry 1997b: 107 n. 2, which does not include *CIL* 4.10441, but does include *CIL* 4.10414.
 22. Note, however, that Fulford 1998: 68 states that evidence from excavation in this room indicates that the counter was constructed during the /8a.d. 60s or 70s. Elsewhere (p.63) he states that the wine held in the containers found stored in the northwest corner of the *atrium* of the Casa di Mestrius Maximus was probably intended for sale at the bar located in this room. Timby 2004: 387 similarly assumes that the wine *amphorae* found in the complex held wine intended for sale at this bar. *CIL* 4 includes a *titulus pictus* on an *amphora*, identified as a Schne 8 (*CIL* 4.10322), that was said to have been found in this structure inside the *thermopolium*, presumably referring to this room.
 23. The term *culleus* was also employed to indicate a standard unit of liquid measure equal to 20 *amphorae* (ca. 523 l).
 24. Groups of *amphorae* stored in inverted position have been uncovered in at least three other locations at Pompeii or its environs. Brion 1960: 53 fig. 12 published a photograph showing a deposit of what appear to be Dressel 24s stacked in inverted position in two or more tiers, identifying the location simply as *Regio* 1. A house at *Regio* 1, *Insula* 14, doorways 1314 excavated during the 1980s or early 1990s produced a similar group of containers. From a photograph published in Quattrocchi 1992: 60 it appears that this consisted of at least thirtyfour *amphorae* stacked in an inverted position

in a twotiered arrangement, with the true number probably considerably more than this. Most or all appear to be Dressel 24s. Given the fact that in both instances the containers appear to consist primarily or exclusively of Dressel 24s, it cannot be excluded that these may be newly manufactured containers awaiting their initial filling rather than a group of used containers assembled for reuse. In the environs of Pompeii, Fergola 2004: 104 states that the excavations at Villa B at Oplontis uncovered hundreds of *amphorae* stored in inverted position in the peristyle of this structure, which appears to have functioned as a facility for the packaging and storage of foodstuffs. From photographs published in Fergola 2004: 20, 104 it appears that these containers, which at some points were stacked in three tiers, are largely or exclusively Dressel 24s, and here too it cannot be excluded that these may be newly manufactured *amphorae* awaiting their initial filling.

25. For this method for the fabrication of *amphora* stoppers see Section 6.17.
26. Schne published the *tituli picti* recovered at Pompeii, Stabiae, and the villas in their environs up through 1866 in *CIL* 4, 16985, 1879, 226 (*CIL* 4.25512775, 28142880). Mau published those recovered at Pompeii and the villas in its environs during the period ca. 1866–1908 in *CIL* 4, *supplementum*, pars 2, 61976, 67795, 72432 (*CIL* 4.55106243, 62756599, 69117007), and Della Corte published those recovered at Pompeii and the villas in its environs during the period ca. 1908–1956 in *CIL* 4, *supplementum* 3, pars 3, 3 *Lieferung*, 965996, 9981008 (*CIL* 4.93139676, 97019821), and *CIL* 4, *supplementum* 3, pars 3, 4 *Lieferung* 107793, 10951103 (*CIL* 4.1026110391a, 1039810477). Ciprotti published the *tituli picti* recovered at Herculaneum in *CIL* 4, *supplementum* 3, pars 3, 4 *Lieferung* 11361146, 114850 (*CIL* 4.1071810847, 1087210913). In many cases a single *CIL* number was employed for two or more identical texts appearing on different *amphorae*, and the number of *tituli picti* documented in these fascicules thus exceeds the number of *CIL* numbers assigned (ca. 2,300) by a substantial amount. The *tituli picti* published in *CIL* 4 represent only an undefined portion of the corpus of these texts that have been recovered at the Vesuvian sites up through the present.
27. For a critical discussion of the SchneMau classificatory scheme see Panella 19745: 1514. Note that when Mau expanded the set of fifteen forms elaborated by Schne he began his enumeration with 15 rather than with 16, with the result that the combined scheme includes both a Schne 15 and a Mau 15.
28. Panella, for example, was able to locate only 18 of the nearly 400 *amphorae* identified as Schne 8s, and only 17 of the ca. 200 containers identified as Schne 10s. See Panella 19745: 158, 160.
29. See Panella 19745: *passim* for various inconsistencies in the application of the SchneMau classificatory scheme and recording errors. For a general discussion of the many shortcomings in Della Cortes treatment of epigraphic materials from Pompeii see Mouritzen 1988: 1223.
30. Mau believed that this was the first of the two texts on this container to have been executed.
31. For a discussion of these two groups of containers see Pea forthcoming.
32. This same individual may be attested in two other *tituli picti* from Pompeii, *CIL* 4.2706 (Schne 9) and *CIL* 4.9532 (Schne 11). See Andreau 1974: 245.
33. Della Cortes suggestion that *CIL* 4.10302, a *titulus pictus* on a container identified as a Schne 12, may indicate a content of thymeflavored honey is not convincing.
34. See later in this section.
35. Della Cortes suggestion that *CIL* 4.9455, a *titulus pictus* on a container identified as a Schne 11 that reads *VTICE*~~*NSE*~~, should be expanded as *Uticense* (*lomentum*) is not convincing.
36. A *titulus pictus* on a third container of unspecified form (*CIL* 4.2615) shows pronounced points of similarity with the texts on these two containers and is probably related to them.
37. MarangouLerat 1995: 65, 142 indicates that she was unable to relocate in the storerooms at Pompeii the vessel published in *CIL* 4.5570, identified as a Schne 8, hence likely a Cretan 2, which bore a *titulus pictus* including the entirely unambiguous string *TRIFOLIN*.
38. Will 2001: 263 claims that the numerous Spanish fish products *amphorae* from Pompeii that bear *tituli picti* indicating a content of *lympha* represent containers that were systematically reused, following repitching, for the packaging of dilute wine. For the likelihood that *lympha* and its several variants refer to a fish product of some sort rather than to wine, however, see Manacorda 1977: 127.
39. *CIL* 15, 657699 (*CIL* 15.45294898). This excludes the large number of *tituli picti* from Monte Testaccio, almost exclusively on Dressel 20s, published in *CIL* 15, 560657. These represent only an

- undefined portion of the entire corpus of the *tituli picti* that have been recovered at Rome up to the present, and numerous additional texts have been published elsewhere.
40. For the functions of the *graffiti* and *tituli picti* that occur on examples of the Late Roman 2 see Karagiorgou 2001: 14950.
 41. For the date of the Keay 35A see Keay 1998: 1445.
 42. For the date of the Keay 59 see Keay 1998: 145.
 43. See Liou and Marichal 1978: 17073 No. 78 for a probable Keay 62 from the Golfe du Fos bearing a similar *titulus pictus*: α ω σπη σπη σπη. The expansion of the string of three letters repeated in lines 24 of this text is uncertain. It may represent the rendering in Greek letters of some form of the Latin *spes* [hope].
 44. For the date of the Keay 62 *amphora* see Keay 1998: 1457.
 45. For an incident in /8A.D. 5356 in which the Bishop of Milan purchased grain for the provisioning of the indigent in the midst of a food crisis see Durlat 1990: 432 and n. 27.
 46. See Arthur and Oren 1998: 199 for an African 2 bearing a *titulus pictus* that may consist of a *chi rho* monogram recovered as a surface find at a site in the northern Sinai.
 47. Coarelli 1999 locates this facility on the left bank of the Tiber and farther upstream in the Tor di Nona area.
 48. See, for example, Seneca *Epistulae morales ad Lucilium* 118.15, which, in referring to the two major types of ceramic wine storage containers, terms them *dolium* and *lagona*. That during the later fourth century the *lagona* was understood as a specific form of container that might have a capacity as large as one *amphora* is illustrated by Augustine *De consensu evangelistarum* 80 (157). Evidence that this term was used to refer to full-sized wine *amphorae* is provided by *CIL* 15.4536, a *titulus pictus* on a fragment of an *amphora* found at Rome that Dressel characterized as similar to his Form 2. Although the interpretation of the text is problematic, it clearly refers to the container as either a *lagona* or a *lacona*. For a Dressel 30 recovered at the Domus Tiberiana at Rome with a *titulus pictus* that should perhaps be read as *lacona* see Meylan Krause 2002: 213 No. 622.
 49. Although these activities may have included the sale of newly manufactured *amphorae* to traders, the only evidence that *amphorae* were produced either at Rome or anywhere in the city's immediate environs during the imperial period consists of two references in Martial (*Epigrammata* 1.18.2; 12.48.14) to a *cadus Vaticanus* [*cadus* from the area of the Vatican]. For archaeological evidence for *amphora* production in areas somewhat further afield see Rizzo 2003: 1434.
 50. A *graffito* from the Praedia Iuliae Felicis at Pompeii (*Regio* 2, *Insula* 7, number 10) that concerns a man who had held eight different occupations gives one of these as *laguncularia* (i.e., *laguncularius*), apparently meaning a maker of *lagunculae* [small *lagonae*]. See Della Corte 1958: 12830.
 51. An alternative interpretation is that the *ampullae* mentioned in this text were small flasks containing sample wine supplied for the purpose of the taste test, with the bulk of the tax wine conveyed to Rome in *cupae*. For a critique of this interpretation see Pea 1999: 178 n. 30.
 52. See Lang 1976: 827 for a group of forty-five *amphorae* bearing *tituli picti* indicating that they were used for the packaging of tax wine that were recovered at the Agora at Athens in contexts dating from the late third through the sixth century. These belong to several classes of small *amphorae* of probable Anatolian origin. Most of these were found (many discarded in wells) in the area around a structure that may have had a public function.

Chapter 6: The Reuse of Amphorae for Purposes Other than as Packaging Containers

1. In similar fashion, the word employed to refer to a sherd in Late Hebrew, חֶרֶס [cheres] (plural חֶרֶסִים [*charsim*]), was also used to refer to a ceramic vessel, and the Greek word for oyster shell, ὀστράκον [*ostrakon*] (plural ὀστράκα [*ostraca*]), was employed to refer both to a sherd and to a ceramic vessel.
2. For this issue see also *Mishnah* Nezikin Abodah Zara 2.4; *Talmud Yerushalmi*, Nezikin Abodah Zara 2.4.
3. Although the term employed here by Varro *vasa olearia* might refer either to *dolia* or *amphorae*, Pliny (*Naturalis historia* 16.73.307), citing this same passage, refers to the containers in question as *olearii cadi*, indicating that he understood Varro to be referring to *amphorae*.
4. For the argument that the standard Egyptian *monochoron* was substantially smaller in the range of 7 l see Rathbone, 1991: 469.

5. MartinKilcher 1987: 1527 suggests that the examples of these *graffiti* that appear on Dressel 20s represent the conversion to a volumetric measure of the figure for the amount of oil that the container held in pounds; the latter information was regularly indicated in a *titulus pictus* located on the vessels neck. This explanation fails to account for the fact these *graffiti* also appear on examples of the Gallic 4, a class that had a primeuse content of wine, which would have been measured in volume rather than weight.
6. It seems a fair assumption that Roman ships and small craft regularly employed *amphorae* as containers for small supplies of pitch and similar materials that they carried with them. See, for example, Santa Maria Scrinari 1979: 43, tav. .1, for the presence of a wine *amphora* filled with tar found aboard one of the small craft recovered in the Claudian basin at Portus, Oneraria Maggiore 2, dated to the late first or second century, and Parker 1992a: 3723 for several *amphorae* filled with pitch found among the cargo of the St Gervais B wreck, dated to the period /8a.d. 600625.
7. For anecdotal evidence for this practice from the literary sources see Gellius *Noctes Atticae* 15.12.4.
8. For the assumption that the recovery of *amphorae* from well contexts points to their reuse as water jars see Callender 1965: 35, citing examples from Bar Hill and Saalberg. For the inference that jars and other table and utilitarian ware forms recovered in wells were employed for the drawing of water see Evans 1993: 105.
9. Freed 1994: 35 says of these two containers: The small size and sturdy handles of this *amphora* made it ideal for the rough job of picking up sea water, and this was undoubtedly its function at the time of the wreck. The exact operation that she here envisages is somewhat unclear, although it may perhaps be the use of these containers for the bailing of bilge water.
10. For a more detailed description of the modifications to these two vessels see Section 10.6.
11. DeLaine 2000: 126 identifies the object as a load of mortar carried in a half *amphora*. MacDonald 1982: 158, in contrast, describes it as mortar in a basket. Adam 1994: 85 is noncommittal, terming it simply a trough of mortar.
12. For three *amphora* bottoms recovered in the excavations of the Agora at Athens in contexts dated to 480 /8b.C. with incrustations on their interior surfaces indicating that they were reused as paint containers see Lawall, Lynch, Papadopoulos, and Rotroff 2002, 41619.
13. For the Wadi Umm Hussein settlement see Section 10.2.
14. Tomber 2006: 295 reports three additional spikes from examples of the Egyptian Biconical *amphora* recovered in the excavations at Wadi Umm Hussein that she believes were employed as incense burners, although it is unclear whether these had black residue on their interior surfaces. She also describes (p.295 no. 37, 296 fig. 4.5.37) an object consisting of a sherd preserving one side of the neck of an Egyptian Biconical *amphora* with a body sherd from an example of this same class wedged inside it to form a floor and held in place with mud, which she believes functioned as an incense burner. S. Sidebotham (personal communication, March, 2005) reports that the excavations at Berenike, on the Red Sea coast of Egypt, recovered several *amphora* spikes with burned interior surfaces suggesting that they had been employed as torches.
15. See Columella *De re rustica* 12.8.1 for the drilling of a hole in the base of a ceramic vessel in connection with the description of a method for the making of sour milk: *Ollam novam sumito, eamque iuxta fundum terebrato* [Take a new cookpot and drill a hole in it near the base].
16. See also in this regard *Expositio terminorum per diversas provincias positorum* (p.262.36): *Orcas in fine invenies* [You will find jugs on a boundary]; *Ex libris latini de terminibus* 248.13 *Si testaceos terminos aut tegulas aut imbrices inveneris . . .* [If you find markers made of pottery, or pan tiles, or cover tiles . . .]; and *Gaius et Theodosius auctores* 252.13 *Terminus testaceus in p.CCCCL* [A boundary marker made from pottery lies 450 feet away (i.e., from another)].
17. For this pile of sherds see Section 9.1.
18. The recent excavations at Quseir alQadim, on the Red Sea coast of Egypt, have produced a wealth of information regarding the wide variety of methods employed in the Roman world for the stoppering of *amphorae* thanks to the exceptional preservation of organic material and plaster that characterizes this site. For an overview of the various stopper types attested at Quseir alQadim see Peacock, et al. n.d.; Peacock, Blue, and Moser n.d.
19. Pliny *Naturalis historia* 16.13.34 uses *obturamentum* to refer to cork stoppers employed for the closing of containers that he terms *cadi*.

20. For instances from shipwrecks see Parker 1992a: 254 no. 631 (Mare A, ca. 1501 /8b.C.; 1 Apulian *amphora*); 9091 no. 153 (Cala Rossano, ca. /8a.d. 150; several Dressel 711s), 157 no. 347 (Cala Culip 4, /8a.d. 60s or 70s; numerous (at least seventysix?) Dressel 20s); 455 no. 1240 (Yassi Ada B, late fourth or early fifth century; numerous examples of three unspecified classes of *amphora*); 301 no. 782 (La Palu, sixth century; several stoppers made from *amphora* and tile). See also Bass and van Doorninck, 1982: 16061, for the Yassi Ada A shipwreck of the /8a.d. 620s, where 165 sherd disks were found inside or in association with examples of the Late Roman 1 and Late Roman 2. For the sherds disks from the midsecondcentury Grado wreck see below.
21. Compare with Aquileia, where Chinelli 1994: 480 reports that a group of eightysix sherd disks from various contexts ranged in diameter from 3 to 8.3 cm, the Yassi Ada A shipwreck, where Bass and van Doorninck 1982: 16061 report that the 165 sherd disks recovered varied in diameter from 4 to 9.7 cm, with most in the range 5.7 cm, and Wadi Umm Hussein, where Tomber 2006: 300 reports that a group of 245 sherd disks from various contexts ranged in diameter from 0.7 to 13.0 cm.
22. Chinelli 1994: 480 makes similar observations regarding the techniques employed to manufacture the group of eightysix sherd disks from Aquileia.
23. Excluded from these figures are 8 of the 377 items listed by Fulford, including 6 disks certainly or possibly made from a fragment of brick or tile, 1 diskshaped lamp sherd, which may well have broken away in this shape rather than being reworked, and one disk of sandstone.
24. The larger portion of sherds manufactured from sherds of African *Sigillata* in the Carthage group may also account for the somewhat higher percentage in this group of disks that have a diameter less than 3.0 cm.
25. See also Bird, Claridge, Gilkes, and Neal 1993: 98, where sherd disks from the Porta Pia site in Rome are referred to as sherd counters. Lawall et al. 2002: 4237 argues that sherd disks recovered in Geometric and Archaic contexts in the Agora at Athens were employed for wiping the anus following defecation. This interpretation is unconvincing, however, as these objects, which often have rough, irregular edges (in contrast with pebbles, which the literary sources indicate were regularly employed for this purpose), would seem singularly unsuited for such an application.
26. For references to this game in Greek literary sources of the preRoman period see Aristophanes *Equites* 855; Plato *Respublica* 521c; Plato *Phaedrus* 241b; Plato Comicus fragment 153.
27. Degeest 2000: 140 reports that the hole in a pierced disk from Sagalassos was produced by drilling in from either side of the sherd.
28. The excavations undertaken at Wadi Umm Hussein during the period 1987 to 1993, for example, recovered over 9,000 *ostraca*, of which 34,000 are suitable for publication. See Bingen 1996: 31.
29. For the continued use of *ostraca* into the Byzantine period see Cribiore 1996: 70.
30. For a listing of publications of the major collections of *ostraca* see Oates, Bagnall, Clackson, OBrien, Sosin, Wilfong, and Worp 2001. The Duke Data Bank of Documentary Papyri maintains a regularly updated version of this listing at <http://odyssey.lib.duke.edu/papyrustextsclst.html>. For *ostraca* bearing texts consisting of school exercises see Cribiore 1996: 634 and *passim*. For *ostraca* bearing texts consisting of passages from literary works see Mertens 19751976.
31. The *locus classicus* for the use of *ostraca* by the poor occurs in Diogenes Laertius *De clarorum philosophorum vitis* 7.174, probably written during the first half of the third century, where it is reported that the Stoic philosopher Cleanthes (331/232 /8b.C.) was said to have written on sherds and the shoulder blades of oxen rather than on papyrus as he could not afford the latter.
32. The classic expression of this attitude can be found in Wilckens introduction to the study of *ostraca* published in 1899 and reprinted in 1970: *Ich muss dies Anderen überlassen, die besser dazu qualifiziert sind. Mein Augenmerk war zu sehr auf die Entzifferung der schwierigen Texte gerichtet, als dass ich auf die keramischen Eigentümlichkeiten immer genügend hätte achten können.* [I must leave this (topic; i.e., the pottery on which *ostraca* were written) to others better qualified for this than I. My attention has been focused too much on the deciphering of the problematic texts for me ever to pay sufficient attention to the characteristics of the pottery.] (Wilcken 1970: 13) To be fair, this was written long before the development of Roman *amphora* studies. Yet little appears to have changed in the last one hundred years. Thus, Marichal edition of the Bu Njem *ostraca*, published in 1992, contains only a brief and inadequate discussion of the documents as physical objects, making no effort, for

- example, to identify the pottery classes to which the sherds employed for their production belong. See Marichal, 1992: 1516. Similarly, Cribiore 1996, a study of school exercises produced on various media in GrecoRoman Egypt, indicates the dimensions of the numerous *ostraca* included among the corpus of these texts, but otherwise has nothing to say about the physical characteristics of these documents.
33. Noteworthy efforts to consider groups of *ostraca* within their archaeological context include Marichal 1992 for the Bu Njem *ostraca*; Bingen 1996, Bingen, BülowJacobsen, Cockle, Cuvigny, Rubinstein, and Van Rengen 1992, Bingen, BülowJacobsen, Cockle, Cuvigny, Kayser, and Van Rengen 1997, and Cuvigny 2000 for the Wadi Umm HusseinMons Claudianus *ostraca*; and Pea 1998 for the Carthage Ilôt de l'Amiraut *ostraca*.
 34. For an interesting exception see Clarisse and Sijpesteijn 1988.
 35. Cribiore 1996: 64 notes that the sherds employed for the production of school exercises in Greco-Roman Egypt were apparently selected with the length of the text to be written in mind.
 36. For example, both the Bu Njem and the Carthage Ilôt de l'Amiraut groups contain some *ostraca* bearing texts written on surfaces covered with a lightcolored salt scum and others with texts written on reddish, unscummed surfaces.
 37. Cribiore 1996: nos. 34, 37, 93, 113, and 173 are written with their lines of text parallel to the ribbing on the sherd, whereas the lines of text in no. 74 run across the ribbing.
 38. Cribiore 1996: nos. 193, 241, 242 were produced with their lines of text perpendicular to smoothing marks on the sherds.
 39. Steinby 1987: 945 describes an alignment of five Dressel 6As, perhaps associated with a stele dating to the second half of the first century, that presumably served either as an ossuary or as a container for an ossuary.
 40. Baldassare 1987: 131 and 2001: 389 refer to numerous burials in *amphorae* at the Isola Sacra necropolis dating to a span of time running from the first to the early third century. AAVV 2001b: 448 reports an unmodified Mau 35 from the Pianabella necropolis that may have served as an ossuary for a burial dating to the end of the first or early second century.
 41. For the general size classes of Tunisian *amphorae* and the classes belonging to each see Freed 1995: 16670.
 42. Although Osborne and Stirling 1992: 294 states that the sarcophagus was composed of two *amphorae*, this appears to be contradicted by a published photograph of the burial.
 43. For a possible example of this practice see Jashemski 1979: 285.
 44. Freed and Ros 1990, for example, describe an instance in which three Keay 25s were inserted into the structure of the *cavea* of the theater at Carthage during the course of a remodeling carried out at some point during the period ca. /8a.d. 350430.
 45. For a view of the hearth and its hood, in which it is perhaps possible to discern this *amphora* top at the far lefthand side of the hood, see Ling 1997: 93 plate 39. For another possible example of the use of an *amphora* top as a chimney see De Vos and De Vos 1982: 111, which reports the use of the neck from a *vaso di terracotta* [earthenware vessel] for this purpose at the Caupona di Asellina (*Regio* 9, *Insula* 11, doorway 2).
 46. See Jashemski 1993: 25 for another possible example of this practice, in this case *amphora* parts of unspecified nature embedded in a masonry dining couch at the *cauponaofficina libraria* [book shop] at *Regio* 1, *Insula* 2, doorway 24.
 47. See Wilson 2000: 360 for a list of several examples of this practice.
 48. In her survey of 30 *atrium* houses at Pompeii, Allison documented 14 downpipes of this kind, noting that there may have been several additional examples that escaped identification due to the fact that they were completely covered over by masonry. See Allison 2004: 117.

Chapter 7: The Reuse of the Other Functional Categories of Pottery

1. Although lamps and lamp parts were presumably reused for various applications, the author was unable to identify any evidence for this, and this functional category is not therefore included in this section. For the continued use of a lamp that has had its nozzle broken off see *Mishnah* Tohoroth Kelim 3.2.
2. This list of reuse applications might be expanded somewhat by including various passages in the Latin literature that provide anecdotal evidence for the use of vessels termed *dolia* for a variety of

purposes other than the storage of foodstuffs (e.g., float, casing for a fire bomb, resonating chamber in a theater). For these passages see Hilgers 1969: 174.

3. This feature is designated *unità stratigrafica* 1085. See Baratta 1994: 5537 for the similar reuse of casks with their tops and bottoms removed as well liners in the northwest provinces of the empire.
4. For the modification of glass bowls and plates that had lost some portion of their rim and wall by means of scraping and filing, see *Mishnah* Tohoroth, Kelim 30.1.
5. The two sherds in question are Accession Number 6567 from Context B228.
6. In some instances a closed ceramic vessel may have been manufactured specifically to serve as a container for a coin hoard. For a possible example employed as the container for a hoard buried beneath the floor of the House of Q. Fulvius at Cosa at some point during the period 731 /8b.C. see Buttrey 1980: 818, pl. 10.
7. At the time of writing the Santa Marinella hoard is on display in the Museo Numismatico at the Museo Nazionale Romano in Palazzo Massimo alle Terme in association with what appears in a published photograph (Angeli Bufalini 2001: 25) to be the bottom half of a heavily sooted cookpot. Catali, 1989a: 34 however, states that the vessel in which the hoard was deposited was lost at some point subsequent to its discovery, and the vessel employed in the display would thus appear to be unrelated to the hoard.
8. The piece in question is Accession Number 5184 from Context A105.
9. This feature is designated *unità stratigrafica* 1009.

Chapter 8: Maintenance

1. For the preparation of pitch and its use for the lining of *dolia* see Pliny *Naturalis historia* 16.22.53–55; *Geoponica* 6.48. For the coating of the interiors of ceramic vessels with various organic sealants see Heron and Pollard 1988; Beck, Smart, and Ossenkop 1989; Heron and Evershed 1993: 2578.
2. Lancha 1981: 218, following Stern, mistakenly identifies the subject of the scene as the pitching of an oil jar.
3. Cato *De agri cultura* 100 recommends that a new olive oil *metreta* be pretreated by filling it with *amurca*, noting that this will make the jar soak up less oil, render it more resistant, and improve any oil placed inside it.
4. Columella *De re rustica* 12.49.11 notes that *metretae olivariae* should be pretreated by soaking in liquid gum rather than pitch.
5. Interesting in this regard is *Mishnah* Tohoroth Kelim 10.2, which lists the various substances that can and cannot be used to seal the covers of vessels in order to afford their contents protection from uncleanness. The substances that are permitted to be employed for this purpose include lime, gypsum, pitch, wax, mud, excrement, crude clay, and potters clay, whereas those that cannot be employed include tin, lead, fig cakes, and dough kneaded with fruit juice.
6. The author inspected these containers in June 2003. The thirtysix *dolia* in this space are arranged in eight NS rows. For recording reference purposes the containers were numbered by row from north to south, beginning with the westernmost row and moving progressively to the east. The containers for which it was possible to observe evidence of repair included numbers 3, 4, 9, 10, 17, 18, 22, 23, 29, 33, 34, and 36.
7. This name is appropriate, as the technique involved is essentially identical to the so-called mortice and tenon technique that Roman builders employed for clamping together masonry blocks. For this technique see Adam 1994: 547.
8. The vessel in question is vessel number 22 in the numbering system described in note 6.
9. For the slab building technique and the fractures that tend to be associated with it see Rye 1981: 712. In historically recent times traditional potters working in various parts of the Mediterranean have employed the coil building technique to manufacture storage jars similar in size and shape to *dolia*. For the coil building technique and the fractures that tend to be associated with it see Rye 1981: 678. For potters working in the Chianti region of Italy see Carnasciali and Roncaglia 1986, unnumbered plates at rear of volume. For potters working in the Messenia district of Greece see Blitzer 1990: 685. For the tendency for storage jars produced in this region to fracture along the junctures between coils see Blitzer 1990: 690.
10. The vessel in question is vessel number 18 in the numbering system described in note 6.
11. The vessel in question is vessel number 9 in the numbering system described in note 6.

12. A *dolium* of unspecified provenience on display in the garden at the entrance to the Museo Nazionale Romano delle Terme appears to have been repaired in more or less the same manner. The vessel, which is mounted in inverted position, bears several irregular cracks on its lower portion. These are filled with lead and braced by means of doubledovetail tenons.
13. The melting temperature of lead is 327°C, whereas some leadtin alloys have melting temperatures as low as 183°C. See Thornton 1998: 11.
14. Although Pavolini 1983: 224 states that the facility contained over 100 *dolia*, the plan reproduced on page 96 of this work indicates only 96 such containers.
15. At the time of the authors visit in June 2003, most of the containers were largely overgrown with vegetation and on this account either extremely difficult or impossible to examine.
16. Six of these vessels bore repairs clearly made subsequent to their excavation. These consisted of small mortices with straight sides and rounded ends cut into the vessels interior surfaces with holes drilled through the vessel walls at either end. A loop of metal wire passed through the holes from the vessels interior, with the two ends presumably tied off in some fashion on the exterior. The technique employed for these repairs is generally similar to that described for the repair of a modern oil storage jar by Pirandello in *La Giara*, for which see note 19.
17. The vessel in question is designated *unità stratigrafica* 1005.
18. For repaired *dolia* at villas in the environs of Pompeii see Anecchino 1982: 756, 757. For the villa at Posto, in northern Campania see Cotton 1979: 82 nos. 2 and 7. For the villa at Monte Gelato, in southern Etruria, see Potter and King 1997: 248 nos. 536. For a rural site, perhaps a villa (Site 890.D), near the mouth of the Fiume Mignone, in southern Etruria, see Angioni 1990: 259 tav. 334, 261 tavv. 336.34.
19. For a modern analogue see the short story *La Giara*, by Luigi Pirandello (Pirandello 1927: 314). The story, set on an agricultural estate in Italy, presumably during the late nineteenth or early twentieth century, revolves around the repair of a large and costly olive oil storage jar similar to a *dolium* that has been split neatly down the middle into two pieces. The task is undertaken by an itinerant craftsman referred to as a *conciabrocche* (literally, a curer of pitchers), who is summoned to the estate specifically for this purpose.
20. See in this connection Apicius *De re coquinaria* 5.2.1, which calls for the use of a *caccabus mundus* [clean casserole] for the preparation of a dish consisting of lentils and mussels, and 5.4.2, which requires a *Cumana munda* [clean Cumaean vessel] for the cooking of beans.
21. For the surface abrasions sometimes produced by the cleaning of lowfired cookwares see Skibo 1992: 10543.
22. See, for example, Juvenal *Satura* 3.2612: *Domus interea secura patellas iam lavat . . .* [Meanwhile, safe at home, the family washes the dishes . . .].
23. Apicius *De re coquinaria* 1.6 refers to the fumigation with laurel and cypress smoke of a *vas* [container] to be employed for the purification of *liquamen*.
24. For the characteristics that distinguish cracks that form during drying from those that form during firing see Rye 1981: 66.
25. See also in this connection *Talmud Babli* Yoma 78b, which refers to a rabbi who obtained vessels in damaged condition for his children to play with. In this case the vessels were presumably wasters.
26. Accession Number 3505, from contexts B270 and B264, both deposited during the period ca. /8a.d. 50052550.
27. See Schreiber 1999: 2213 for the Athenian psykteramphora, a doublechambered form with two spouts that functioned in this way.
28. Ward 1993: 19 reports that at Piercebridge some of the repairs made to Gallic *Sigillata* vessels involved brass bracing elements, whereas Marsh (1981) 227 indicates that repairs made to Black Burnished 1 vessels from Cefn Graeanog, a native site in Wales, involved iron bracing elements. In neither case is it clear whether the repairs in question involved the hole and clamp technique, the mortice and tenon technique, or the hole and lace technique.
29. For Roman bow drills see Adam 1994: 989.
30. This vessel (Accession number PRB ST 84 SF 691) is at the time of writing on display at the British Museum, Room 49 (Roman Britain), Case 7 (Stonea Grange). Two photographs of this vessel are available at <http://www.ceramicstudies.me.ukframe1tu8.html#HC08Pic.8019> and <http://www.ceramicstudies.me.ukframe1tu8.html#HC08Pic.8017>.

31. It is interesting to note in this connection that Parsons and Curl 1963, a handbook for the mending and restoration of china, recommends (p.71) the use of an identical arrangement of five rivets for the repair of a teacup split in two by a break of a similar configuration.
32. Accession Number 5754, from context B160.
33. *Unità stratigrafica* 5073.
34. All subsequent references to this sherd assume that it is being viewed from the exterior of the vessel unless otherwise indicated.
35. Ward 1993: 19 questions whether the bracing repairs carried out to several examples of the Gallic *Sigillata* Dragendorff 33 cups from Piercebridge would have rendered these vessels liquidtight.
36. For the repair of pottery by means of laces in the modern period see Williams 1988: 148.
37. Also worth noting in this connection is an example of a Keay 35 *amphora* reused as a sarcophagus from a necropolis outside Ravenna that was cut open to receive the body of the deceased and then pieced back together with laces consisting of iron wire that were passed through what appear to be drilled holes. For this vessel see Brizio 1904: 177, 183 Figs. 45, 184.
38. Accession Number 6565, from context A20, deposited during the period ca. /8a.d. 310320350360; Accession Number 6566, from context B340, deposited during the period ca. /8a.d. 400425500525.
39. Ward 1993: 20 suggests that the rarity of repairs at Piercebridge that can be dated to the third century may reflect the fact that these vessels were handled with extreme care due to their scarcity, and thus rarely broken. This explanation is not convincing, however, because the vast majority of these vessels, regardless of the care with which they were handled, presumably suffered significant breakage sooner or later, requiring either their repair or their retirement from prime use.
40. For itinerant pottery menders known as *aconciastoviglie* [crockery curers] at Rome during the early modern period see La Stella 1996: 28.
41. Although the author is aware of no reference to the occupation of tinker in the surviving Latin literature, it can be assumed that such craftsmen existed, perhaps known by an occupational title such as *refector ahenorum* [mender of bronze vessels].

Chapter 9: Recycling

1. For Roman ramming and tamping instruments see White 1975: 58.
2. For Roman grinding implements see White 1975: 912.
3. For Roman concrete construction see Adam 1994: 7687, 12557; Gazda 2001. DeLaine 2001: 230 observes that construction of this type should more properly be termed mortared rubble construction.
4. Heres 1982: 33 notes, however, that large sherds are frequently visible in the mortar beds between courses of facing elements in structures built at Rome and Ostia during the fifth and sixth centuries.
5. For additional applications of *amphora* sherds as aggregate in concrete construction, fill in rubblework, and fillreagent in hydraulic linings in the area of the harbor at Cosa see Gazda 1987: 80, 83, 84, 89, 92; Oleson 1987: 104.
6. For Roman mudbrick and *terre pis* see Adam 1994: 5962. For pottery and other refuse as an inclusion in mudbrick see Schiffer 1996: 111; Kemp 2000: 82; Bourriau et al. 2000: 143; David and Kramer 2001: 97.
7. A second example of an *impluvium* with a paving of this kind occurs at Pompeii in the Casa della Caccia Antica (*Regio* 7, *Insula* 4, doorway 48).
8. Romans may sometimes have referred to this material as *testaceum opus* and/or *testaceum corium*. See Giuliani 1992: 92; Grandi Carletti 2001: 190. Modern scholars frequently refer to it as hydraulic cement owing to the fact that it was capable of curing and hardening when submerged in water.
9. Marchese et al. 1999: 239 state, without indicating the basis for this assertion, that the ceramic in *cocciopesto* consisted of partially fired material obtained from misfired architectural ceramics.
10. The author would like to thank J. Ikäheimo for bringing this application to his attention and for providing the photographs reproduced here.
11. For Roman cement pavements see Adam 1994: 232; Dunbabin 1999: 2812.
12. See also Pliny *Naturalis historia* 36.52.186, 36.52.188; Faventinus *De diversis fabricis architectonicae* 18, 19.
13. Scholars have generally employed the term *opus signinum*, attested in several Roman literary sources, to refer to pavements of this kind. Giuliani 1992 and Grandi Carletti 2001, however, show that this

usage is based on a misunderstanding of the sources in question, suggesting that the Romans may have employed the term *testaceum pavimentum* to refer to pavements of this kind.

14. For the interpretation of this somewhat problematic passage see Giuliani 1992: 934; Grandi Carletti 2001: 18790.
15. For Roman mortar see Adam 1994: 736.
16. See also Pliny *Naturalis historia* 36.54.175.
17. For analyses of Roman mortar undertaken through the mid 1970s see Wetter 1979: 63 n. 43.
18. For the plaster renderings on Roman walls see Adam 1994: 21620.

Chapter 10: Discard and Reclamation

1. For an important collection of short studies concerned with various aspects of this topic see Dupr Raventós and Remolá 2000. For general patterns of refuse discard at Karanis, in the Fayum, see van Minnen 1994: 23032.
2. See also *Mishnah* Tohoroth Kelim 24.9.
3. For refuse disposal at Rome see also Scobie 1986: 41314; Robinson 1993: 1234; RodríguezAlmeida 2000.
4. RodríguezAlmeida 2000: 125 attributes this change in the archaeological record of the city of Rome to a sharp decline in the practice of recycling *amphorae* as construction filler.
5. Libanius *Orationes* 50, written ca. /8a.d. 385, describes a system in place in Antioch for the removal of construction rubble from the city. See Liebeschuetz 2000: 513. Themistius *Orationes* 4.61a boasts that Constantinople exports only earth, sand, and refuse (presumably as ballast in merchant ships), raising the possibility that provisions of some sort for the regular collection and removal of refuse were in place there.
6. See also in this regard *CIL* 1². 591, Side A, lines 56.
7. For a general restriction against the disposal of refuse in public thoroughfares see *Digesta* 43.10.15 (Papinian).
8. There is, to the authors knowledge, no systematic study of the accumulation of refuse in public thoroughfares in Roman towns. For several studies concerned with the rise of ground level at Ostia, including rise in the level of streets, see Mols and van der Laan 2000: 6197.
9. For representative examples of refuse deposits consisting of pottery and other material see Robinson 1959 (wells); Neuru 1980 (culdesac); Whitehouse, Barker, Reece, and Reese 1982 (building); Arthur 1987 (building); Carver 1987: 15 (stream course); Slane 1994 (pit); Santrot and Broise 1995 (cistern); Pea 1999 (building).
10. The fact that the lot in question was thought suitable for brick making suggests that it might have been located in a part of the town where there was a concentration of ceramic production facilities. If so, the sherds that rendered the area unsuitable for brick production may have been refuse from one or more pottery workshops.
11. The EW extension reported for the West Sebakh is considerably greater than that shown on the plan reproduced in Figure 10.3.
12. Bingen 1996: 35 notes that a similar situation was encountered in a room in the building under the South Sebakh.
13. Maxfield and Peacock 2001: 432 note that the various imperial construction projects that involved the use of Mons Claudianus granite would have been completed by ca. /8a.d. 140, and that there is no evidence for use of the stone in the /8a.d. 140s or 150s.
14. For representative examples of refuse deposits consisting of pottery and other material see Duncan 1965 (pit); MurrayThreipland and Torelli 1970 (building); Kenrick 1989: 817 (well); Albarella, Ceglia, and Roberts 1993 (cistern); Potter and King 1997: 313 and passim (fish pond).
15. Although Lyne and Jeffries 1979 do not indicate this figure in an explicit fashion, from the statement on p.77 n. 3 that midden AH 52, with an estimated volume of 370 m³, represented 12 years of activity and the statement on p.14 that the largest midden, AH 33, which contained two kilns and had an estimated volume of 2,831 m³, represented 45 years of activity it can be inferred that in the view of the authors a figure of ca. 30 m³ of midden per annum per kiln was a reasonable estimate. This work likewise provides no discussion of figures for firing loss rates, save the assertion on p.77 n. 2 that a figure of 20% is high.

16. See, however, *Digesta* 9.3.5 for the throwing of unspecified objects from *horrea* and *apothecae* [storerooms].
17. Rhodes 1989 collects and evaluates the evidence for several deposits of this kind from Italy and the northern provinces of the empire.
18. See *Digesta* 18.6.1 pr. for the breakage of unspecified containers (presumably *amphorae*) being employed for the packaging of wine between the time of their sale and the time of their conveyance to the buyer.
19. For the results of this work see also http://ceipac.ub.edu/MOSTRAe_expo.htm.
20. Freed 1995: 189 nos. 3 and 2. For the capacities of these two containers see Pea 1999: 195 nos. 19.2 and 19.4. Although the efficiency values for these two vessels lie at the upper end of the range attested for the Dressel 20, it should be noted that the overall capacity of these *amphorae* is only ca. one-third to one-half that of most examples of the Dressel 20. Because *amphora* efficiency is, all things being equal, negatively correlated with capacity, these containers represent what is, in effect, a substantially more efficient design than the Dressel 20.
21. Olive oil has a density in the neighborhood of 0.91. See Pea 1998: 117 n. 1.
22. For the presence of substantial quantities of roof tile and pottery in manure pits from several fourth-century /8D.C. houses at the Greek city of Halieis, in the Peloponnese, see Ault 1999.
23. See also in this regard Jansen 1996: 132.
24. For the villas architecture see De Caro 1994: 2794. The description of the villa and its surroundings presented here employs the same convention as that adopted by De Caro in the site publication for referring to the cardinal directions, that is, treating northeast as north.
25. De Caro 1994: 121 speculates that some of the damage to the villa may have been caused by an earthquake not recorded in the literary sources that occurred during the period ca. /8a.d. 759.
26. The excavation of the villa produced the partial remains of an adult male that were probably disturbed in posturption scavenging operations, as well as those of a pig. See De Caro 1994: 75, 76.
27. For the large group of agricultural and woodworking tools recovered in Room 43 at the Casa del Menandro see De Vos and De Vos 1982: 956. Note, however, that De Caro 1994: 1223 speculates that there may have been a tool shed somewhere beyond the boundaries of the excavated area at the Villa Regina.
28. The beaker is too large to fit through the aperture cut into the wall of the lower *amphora*.
29. For the catalog of finds from the villa see De Caro 1994: 131219. The items reported as having been found in the ash layer include the following: Italian *Sigillata*: no. 43; regional cookware: nos. 104, 117, 127, 164, 167, 17071; utilitarian waretableware: nos. 126, 148; lamp: no. 193; glass: nos. 218, 220, 2256; knife: no. 233; items in bronze: nos. 2468.
30. De Caro 1994: 131219. The items reported as having been found in the vineyard around the villa include the following: Italiote wares: nos. 16; Overpainted Ware: nos. 711; Black Gloss Ware: nos. 1236; Internal RedSlip Cookware: nos. 378, 4041; Italian *Sigillata*: nos. 446, 4855, 5868; Eastern *Sigillata* A: nos. 6979, 81; ThinWalled Ware: nos. 8792, 945; regional cookware and utilitarian waretableware: nos. 105, 11314, 145, 172, 187; lamps: nos. 188, 198201; glass vessels: nos. 215, 2214; item in iron: no. 232; items in bronze: nos. 24952, 254; coins: nos. 2556; items in stone: nos. 261, 265. De Caro 1994: 219 states that two fragments of stone revetting were also recovered in the vineyard.
31. De Caro 1994: 131 notes that following the collection of the material present on the ground surface in the vineyards surrounding the villa, rain brought a substantial amount of additional material to the surface, underscoring the fact that the archaeologists had recovered only a portion of the refuse that had been scattered over these areas.
32. For funerary offerings in the Roman world see Pellegrino 2001; Ortalli 1987: 180 n. 121.
33. For the reclamation of cloth from refuse middens see *Mishnah* Tohoroth, Kelim 27.11 and 27.12.

Chapter 11: Modeling the Formation of the Roman Pottery Record

1. This flow diagram would be somewhat more realistic if it provided for the transport to the Rome area of one to four vessels being reused as packaging containers. Some of these vessels (though, in line with the assumptions incorporated in the diagram, no more than two of them) would be disposed of by discard and remain in the archaeological context.

2. Shott 1996: 464 notes that there has been little effort to study the effects of recycling on the formation of pottery assemblages. See Laubenheimer 1998: 69 and Manacorda 2000: 73 for passing references to the possibility that the reuse and recycling of pottery may have influenced the composition of some kinds of discard deposits in the Roman case. Rizzo 2003: 234, in contrast, assumes that recycling and reuse had no significant effects on the composition of pottery assemblages from disturbance (and, by extension, discard) deposits at Rome dating to the first two centuries /8a.d. For the possible impact of the preferential selection of large glass vessels for recycling on the composition of assemblages of glass vessels from Roman sites see Cool and Baxter 1999: 74.
3. See the analysis presented in Freed 1995: 1668 for some of the possible effects of this phenomenon.
4. Exceptional in this regard is the study carried out by Griffiths of variation in pottery consumption at several rural residential sites of second century date in Northamptonshire and the Milton Keynes area in England probably occupied by groups of differing socioeconomic status. See Griffiths 1989, 1990. For the use of faunal evidence to document differences between officers and men in the consumption of meat at the Roman fort at South Shields, in England, see Stokes 2000.
5. For representative examples of this research see Gibb 1996; SpencerWood 1987. For critical comments regarding some of the methods employed for the analysis of pottery assemblages in North American historical archaeology see Pea and Pea 1991.
6. For this phenomenon see the several studies presented in Guidobaldi, Pavolini, and Pergola 1998.
7. For simulations of this kind see Mills 1989; Lightfoot 1993: 17073.

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Abbreviations for Epigraphical Collections:

- CIL: *Corpus inscriptionum Latinarum*.
- ILLRP: *Inscriptiones Latinae liberae rei publicae*.
- RIB: *Roman inscriptions of Britain*.

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